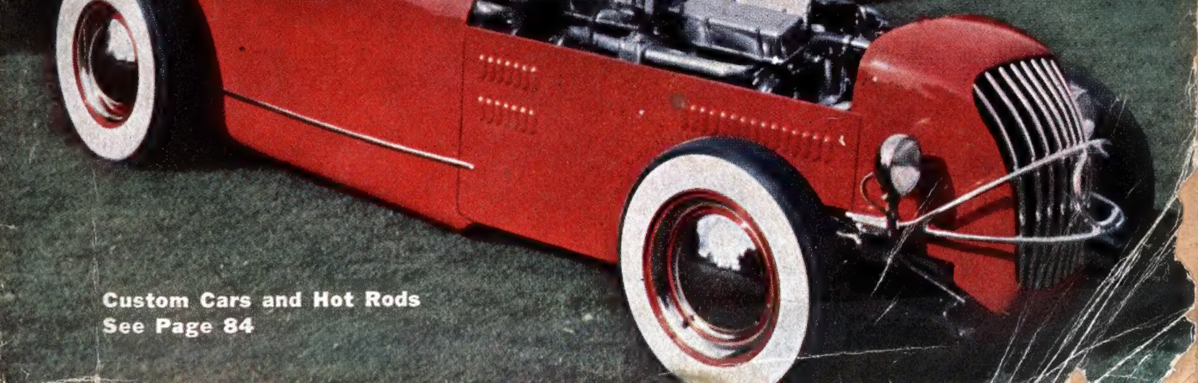
MECHANIX ILLUSTRATED ©

JANUARY

15¢

U. S. ARMED FORCES WILL BUY YOUR INVENTION

BUILD VAMOOSE, 60-MPH OUTBOARD HYDROPLANE



Custom Cars and Hot Rods
See Page 84

DEFENSE and what it means to you!

1 If you are of draft age—you may or may not be called to service. But either way, I. C. S. training can give you the skills that mean a more important job. You can't lose—if you are inducted, your I. C. S. payments may be stopped and your studies suspended if you wish.

2 If you want to get into defense work—you'll have a better chance of landing a job . . . a better chance of getting ahead . . . if you have training. And you can get that training at home in your spare time from I. C. S.

3 If you want to stay in your present field—there will be new job vacancies as the demands of the services and defense industries are stepped up. The men who move into these better jobs will be *trained* men. One of them might be you . . . with the help of I. C. S.

Any way you look at it, I. C. S. training will fit you for the demands of today, will help put you in a position of importance. So mail the coupon . . . today!

INTERNATIONAL CORRESPONDENCE SCHOOLS

APPROVED
under the
G.I. BILL

BOX 2320-X, SCRANTON 9, PENNA.

Without cost or obligation, please send me full particulars about the course BEFORE which I have marked X:

Air Conditioning and Plumbing Courses
☐ Air Conditioning
☐ Heating ☐ Plumbing
☐ Refrigeration ☐ Steam Fitting
Chemical Courses
☐ Chemical Engineering
☐ Chemistry, Analytical
☐ Chemistry, Industrial
☐ Chemistry, Mfg. Iron & Steel
☐ Petroleum Refining ☐ Plastics
☐ Pulp and Paper Making
Civil Engineering, Architectural and Mining Courses
☐ Architecture
☐ Architectural Drafting
☐ Bridge and Building Foreman
☐ Building Estimating
☐ Civil Engineering
☐ Coal Mining
☐ Contracting and Building
☐ Highway Engineering
☐ Lumber Dealer
☐ Reading Structural Blueprints
☐ Sanitary Engineering
☐ Structural Drafting
☐ Structural Engineering
☐ Surveying and Mapping
Communications Courses
☐ Electronics
☐ Practical Telephony
☐ Radio, General ☐ Radio Operating
☐ Radio Servicing ☐ Television
☐ Telegraph Engineering
Electrical Courses
☐ Electrical Drafting
☐ Electrical Engineering
☐ Electric Light and Power
☐ Lighting Technician
☐ Practical Electrician
Internal Combustion Engines Courses
☐ Auto Technician ☐ Aviation
☐ Diesel-Electric
☐ Diesel Engines ☐ Gas Engines
Mechanical Courses
☐ Aeronautical Engineer's, Jr.
☐ Aircraft Drafting ☐ Flight Engineer
☐ Forging ☐ Foundry Work
☐ Heat Treatment of Metals
☐ Industrial Engineering
☐ Industrial Instrumentation
☐ Industrial Metallurgy
☐ Machine Shop ☐ Mech. Drafting
☐ Mechanical Engineering
☐ Mold-Loft Work
☐ Patternmaking—Wood, Metal
☐ Reading Shop Blueprints
☐ Sheet-Metal Drafting
☐ Sheet-Metal Worker
☐ Ship Drafting ☐ Ship Fitting
☐ Tool Designing
☐ Toolmaking
☐ Welding—Gas and Electric
Railroad Courses
☐ Air Brake ☐ Car Inspector
☐ Diesel Locomotive
☐ Locomotive Engineer
☐ Locomotive Fireman
☐ Locomotive Machinist
☐ Railroad Section Foreman
☐ Steam-Diesel Loco. Eng.
Stationary Eng'r'g Courses
☐ Boilermaking
☐ Combustion Engineering
☐ Engine Running
☐ Marine Engineering
☐ Power Plant Eng'r'g ☐ Steam Engr.
Textile Courses
☐ Cotton Manufacturing
☐ Loom Fixing ☐ Rayon Weaving
☐ Textile Designing
☐ Woolen Manufacturing
Business and Academic Courses
☐ Accounting ☐ Advertising
☐ Bookkeeping
☐ Business Administration
☐ Bus. Correspondence ☐ Bus. Law
☐ Certified Public Accounting
☐ Commercial ☐ Commercial Art
☐ Cost Accounting
☐ Federal Tax ☐ First Year College
☐ Foremanship ☐ French
☐ Good English ☐ High School
☐ Higher Mathematics ☐ Illustration
☐ Industrial Supervision
☐ Motor Traffic ☐ Postal Civil Service
☐ Retailing ☐ Retail Bus. Management
☐ Salesmanship ☐ Secretarial
☐ Sign Lettering
☐ Spanish ☐ Stenography
☐ Traffic Management

Name ____________ Age ______ Home Address ____________

City ____________ State ____________ Working Hours ______ A.M. to ______ P.M.

Present Position ____________ Employed by ____________

Length of Service in World War II ______

Enrollment under G.I. Bill approved for World War II Veterans. Special tuition rates to members of the Armed Forces.
Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.

Title Registered U. S. Patent Office **volume 44** **number 3**

mechanix illustrated

January 1951

*Cover photos—top by Tom McCahill,
bottom by Louis Hochman*

A FAWCETT PUBLICATION

special features

U. S. Armed Forces Will Buy Your Invention 59
By Ralph Coniston

New In Science 64, 65

Fit To Fly A Jet? 66

Spray-Gun Artist 67

Atomic Watch 67

The Most Important 30 Minutes Of Your Life 68
By Lester David

Make-It-Yourself Machine Shop 72

Meet Mr. Typewriter 74
By Harry Kursh

This Month's Prize Gadget—Safety Door Hinge 77

Money-Making Idea—He's A Plastic Baker 78
By Louis Hochman

Helicopters For Everybody 80
By Frank Tinsley

New For The Home 83

Custom Cars And Hot Rods 84

MI Tests The '51 Studebakers 88
By Tom McCahill

McCahill Drives The Chrysler Station Wagon 90

175 HP For Your V-8 92

New For The Road 93

Hunting Russians In North Carolina . . 94
By Raymond R. Camp

New For The Sportsman 97

Clown Town, Texas 98
By Joe Whitley

Toys For Engineers 102

Hobby Hall Of Fame—GE's Vincent Schaefer 104

Editor's Workbench 12

Invention Clinic 18

Dear Editor 22

continued on page 6

W. H. FAWCETT, Jr.	President
ROGER FAWCETT	General Manager
RALPH DAIGH	Editorial Director
AL ALLARD	Art Director
LEE WILSON	Production Director
WILLIAM L. PARKER	Editor
FEATURE STAFF	
GILBERT PAUST	Feature Editor
ARTHUR UNGER	News Editor
EDITH KURNIK	Assistant
CRAFTS & HOBBIES STAFF	
ROBERT BRIGHTMAN,	Crafts & Hobbies Editor
JOHN G. KINGDON	Boating Editor
ROBERT LASSON	Associate Editor
DANIEL R. RUBIN	Photography Editor
LARRY EISINGER	Advisory Editor
ART STAFF	
FRANK A. TAGGART	Art Editor
HAROLD E. KELLY	Art Associate
AL HEIGHINGTON	Art Associate
PHIL SWIFT	Art Associate
TOBY O'MARA	Art Associate
JEAN C. IRWIN	In Charge of Production

Copyright, 1950 by Fawcett
Publications, Inc.

MECHANIX ILLUSTRATED is published monthly by Fawcett Publications, Inc., Fawcett Building, Fawcett Place, Greenwich, Conn. Printed in U.S.A. Editorial offices: 67 W. 44th St., New York 18, N. Y. Advertising offices: New York 18, 67 W. 44th St.; Detroit 26, 1659 Guardian Building; Chicago 11, 612 N. Michigan Ave.; Los Angeles 17, 643 S. Flower St.; San Francisco 4, 111 Sutter St. General Offices, Fawcett Building, Fawcett Place, Greenwich, Conn. Shepard Spink, Advertising Director; Roscoe K. Fawcett, Circulation Director; Gordon Fawcett, Treasurer; Allan M. Adams, Secretary; Al Allard, Art Director. Entered as second-class matter at the post office at Greenwich, Conn., under the act of March 3, 1879. Additional entry at Louisville, Ky. Copyright 1950 by Fawcett Publications, Inc. Reprinting in whole or in part forbidden except by permission of the publishers. Title registered in the U. S. Patent Office. Address manuscripts to MECHANIX ILLUSTRATED, 67 West 44th St., New York 18, N. Y. All remittances and correspondence concerning subscriptions as well as notification of change of address should be addressed to Circulation Department, Fawcett Building, Fawcett Place, Greenwich, Conn. Not responsible for lost manuscripts or photos. Unacceptable contributions will be returned, if accompanied by sufficient first class postage. Price 15c a copy. Subscriptions $1.80 per year in the United States and Possessions. 20c per copy in Canada and other foreign countries, subscriptions $2.40 per year in Canada and Pan America. Other foreign countries $3.15 per year. Foreign subscriptions and sales should be remitted by International money order in U. S. Funds payable at Greenwich, Conn. Advertising forms close fifth of second month preceding date of issue.

MEMBER AUDIT BUREAU
OF CIRCULATIONS

WHAT Every MECHANIC Wants to Know

AUDELS CARPENTERS & BUILDERS GUIDES—(4 Book Set)................$6
A practical illustrated trade assistant on modern construction for carpenters, joiners, builders, mechanics and all woodworkers. 4 vols., 1600 pages, 3700 illustrations. Fully indexed, flexible covers. Each volume sold separately $1.50 a vol.

AUDELS PLUMBERS & STEAMFITTERS GUIDES—(4 Book Set)................$6
A Practical Trade Assistant & Ready Reference. Explains in plain language & by clear illustrations, diagrams, charts, graphs, pictures principles of modern plumbing practice including Marine Pipe Fitting and Air Conditioning. 4 Vols.—1670 Pages—3642 Diagrams & Illustrations. Each Vol. Sold Separately $1.50 a Vol.

AUDELS OIL BURNER GUIDE..........$1
384 Pages Covering Installation, Servicing & Repairs All Types Domestic & Industrial Burners. Illustrated. Highly Endorsed.

AUDELS HOUSE HEATING GUIDE..$4
1000 Pages Covering Working Principles, Installation, Service of All Modern House Heating, Ventilating & Air Conditioning Systems. Explains New Radiant Heating. Fully Illustrated & Indexed.

AUDELS REFRIGERATION & AIR CONDITIONING GUIDE........$4
New from Cover to Cover—1280 Pages, Fully Illus. Covering basic principles, servicing, operation & repair of household, commercial & industrial refrigeration & air conditioning. A gold mine of essential important facts for engineers, servicemen, users.

AUDELS SHEETMETAL WORKERS HANDY BOOK...............................$1
Practical inside information. Fundamentals of Sheet Metal Work. 388 pages. Illustrated. 11 sections. Clearly written. Essential & important facts, figures, pointers in everyday language. Ref. Index.

AUDELS SHEETMETAL PATTERN LAYOUTS $4
Developed by Experts for Sheet Metal Workers, Layout Men & Mechanics. A Practical Encyclopedia in 10 Sections, size 7 x 10 x 2—1125 Pages—350 Layouts—1600 Illustrations. 1001 Key Facts. Fully indexed for ready reference in answering your layout problems. Covers all phases of sheet metal work including Pattern Cutting, Pattern Development & Shop Procedure.

AUDELS BLUE PRINT READING......$2
For Mechanics & Builders. Covers all types of blue print reading including ship & airplane. 416 pages, fully illustrated.

AUDELS MATHEMATICS & CALCULATIONS FOR MECHANICS $2
Mathematics for home study or reference. 700 pages, 550 illus. Practical mathematics from beginning. How to figure correctly. Easy, correct methods covering complete review. Illus. & Indexed.

AUDELS AUTOMOBILE GUIDE........$4
A practical quick ready reference book for auto mechanics, service men, operators & owners. Explains theory, construction & servicing of modern motor cars, trucks, buses & auto type Diesel engines. 1700 pages, fully illustrated. 55 chapters. Indexed. A standard book for mechanics. New Hydraulic drive covered.

AUDELS DIESEL ENGINE MANUAL....$2
A practical, concise treatise with questions and answers on the theory, operation and maintenance of modern diesel engines. Over 400 pages, fully illus. All details plainly brought out, this book is of extreme value to engineers, operators & students.

AUDELS WELDERS GUIDE...............$1
A concise, practical text on operation & maintenance of all welding machines for all mechanics. Over 400 pages, illustrated. Covers all methods of electric and acetylene welding including airplane work.

AUDELS MACHINIST & TOOLMAKERS HANDY BOOK $4
Covers modern machine shop practice in all its branches. Tells how to set up & operate lathes, screw and milling machines, shapers, drill presses & all other machine & hand tools. 1800 pages, fully illustrated. Indexed. 5 sections. 1—Modern Machine Shop Practice. 2—Blue Print Reading & How to Draw. 3—Calculations & Mathematics for Machinists. 4—Shop Physics. 5—How to Use the Slide Rule. 60 chapters. Easy to read and understand. A shop companion that answers your questions.

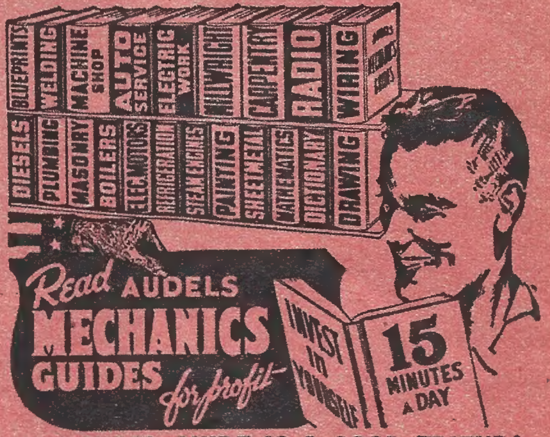
AUDELS ELECTRIC MOTOR GUIDE $4
Practical Information Covering Construction, Control, Maintenance & Wiring Hookups of All Types Electric Motors also Armature Winding. 1000 Pages Fully Illustrated & Indexed.

AUDELS ELEC. WIRING DIAGRAMS $1
[illegible] Pages. Illustrated. Gives practical facts on wiring of elec-[illegible] apparatus. It shows clearly how to wire apparatus for practically all fields of electricity. Each diagram is complete & self-explanatory. Highly Endorsed Pocket Companion.

AUDELS PRACTICAL ELECTRICITY $4
A key to a practical understanding of Electricity. For maintenance engineers, electricians & all electrical workers. 1440 Pages, 2600 Illus. Covers important electrical information in handy form—including wiring for Light & Power. Indexed.

AUDELS RADIOMANS GUIDE $4
A key to the practical understanding of radio including Frequency Modulation, Television, etc., Aircraft & Marine Radio. For radio engineers, servicemen, amateurs, 914 Pages, 633 Illustrations & Diagrams. Photos. Review Questions & Answers, Reference Index.

AUDEL, Publishers, 49 W. 23 St., N.Y. 10



AN AUDEL GUIDE IS A GOOD FRIEND!

Step Up Your Own Skill with the Practical Facts and Figures of Your Trade. Save time and money with right methods, short cuts, labor saving ideas. CHECK NOW! You can look over any Audel Guide in your home. Start the Easy Payments if satisfied.

Check NOW!

Audels List Of Time Tested Practical Handy Books For Mechanics That Will Answer Your Questions

—

Highly Endorsed

MAIL THIS TODAY

YOUR OPPORTUNITY

----CUT HERE----

MAIL ORDER

AUDEL, Publishers, 49 W. 23 St., NEW YORK 10, N. Y.

Please send me postpaid for FREE EXAMINATION books marked (x) below. If I decide to keep them I agree to mail $1 in 7 Days on each book or set ordered and further mail $1 monthly on each book or set until I have paid price, otherwise I will return them.

☐ MACHINISTS HANDY BOOK . . 1650 Pgs. . .	$ 4
☐ WELDERS GUIDE, 400 Pages	1
☐ BLUE PRINT READING, 416 Pages	2
☐ MATHEMATICS & CALCULATIONS, 700 Pages.	2
☐ SHEET METAL PATTERN LAYOUTS, 1100 Pages	4
☐ SHEET METAL WORKERS HANDY BOOK, 388 Pgs.	1
☐ MECHANICAL DRAWING GUIDE, 160 Pages . .	1
☐ MECHANICAL DRAWING & DESIGN, 480 Pages	2
☐ AUTOMOBILE MECHANICS GUIDE, 1800 Pages	4
☐ DIESEL ENGINE MANUAL, 575 Pages	2
☐ AIRCRAFT WORKER, 240 Pages	1
☐ RADIOMANS GUIDE, 914 Pages	4
☐ ELECTRONIC DEVICES, 216 Pages	2
☐ ELECTRIC MOTOR GUIDE, 1000 Pages	4
☐ ELECTRIC WIRING DIAGRAMS, 272 Pages . .	1
☐ ELECTRICIANS EXAMINATIONS, 250 Pages. .	1
☐ ELECTRIC POWER CALCULATIONS, 425 Pages.	2
☐ HANDY BOOK OF ELECTRICITY, 1440 Pages. .	4
☐ ELECTRIC DICTIONARY, 9000 Terms	2
☐ ELECTRIC LIBRARY, 7000 Pages (12 Book Set)	18
☐ MARINE ENGINEERS HANDY BOOK, 1258 Pgs.	4
☐ SHIPFITTERS HANDY BOOK, 250 Pages . . .	1
☐ REFRIGERATION & Air Conditioning, 1280 Pgs.	4
☐ MILLWRIGHTS & MECHANICS GUIDE, 1200 Pgs.	4
☐ POWER PLANT ENGINEERS GUIDE, 1500 Pages	4
☐ ENGINEERS & FIREMANS EXAMS, 525 Pages .	1
☐ PUMPS, Hydraulics & Air Compressors, 1658 Pgs.	4
☐ ENGINEERS LIBRARY (3 Book Set)	9
☐ MECHANICAL DICTIONARY, 950 Pages	4
☐ GARDENERS & GROWERS GUIDES (4 Book Set)	6
☐ CARPENTERS & BUILDERS GUIDES (4 Book Set)	6
☐ PLUMBERS & Steamfitters Guides (4 Book Set)	6
☐ MASONS AND BUILDERS GUIDES (4 Book Set)	6
☐ PAINTERS & DECORATORS MANUAL, 450 Pgs.	2
☐ HOUSE HEATING GUIDE, 1000 Pages	4
☐ OIL BURNER GUIDE, 384 Pages	1

Name________________________

Address________________________

Occupation________________________

Employed by______________________ 17A

I Trained These Men

E. J. STREITENBE
New Boston, O., s
ing course, I ma
week fixing set
time. Now s
Television sets

PHILLIP G
Louisville 8, K
have been ope
Servicing bus
years I did $1
business; net

S. W. DINWIDDI
ville, Ill., writes, "
finishing course, w
servicing shop. N
Engineer of WCUN
Police Radio Insta

A. HERR, New C
Pa., writes, "Ha
doubled my salary since start-
ing in Radio full time. Am employed by Station WKBO as transmitter operator. Future looks bright to me."

L. HAUGER, San Bruno, Calif., tells us, "I accepted a position as Radio and Television Technician . . . promoted to manager of Television Service and Installation."

LEANDER ARNOLD, Pontiac, Mich., says, "While learning, made $5 to $10 a week repairing Radios in my spare time. Now I have a spare time shop in my home."

NORMAN H. WARD, Ridgefield Park, N. J., writes, "4 years ago, I was a bookkeeper with a hand-to-mouth salary. Now I am employed by a key ABC station."

H. B. MILLS, Washington, Ohio, finds, "Word traveled fast in regard to my N.R.I. training. Have been doing Television installation and servicing, tracing out and eliminating interference, etc."

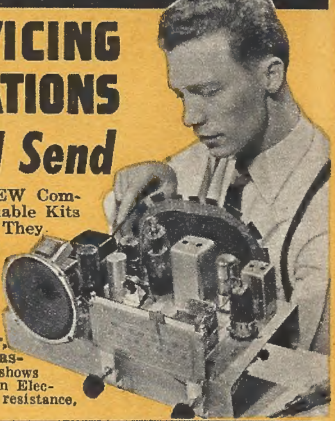
C. STAETH, Fort Madison, Iowa, informs us, "Do Radio Servicing full time in my own shop and am making more money than ever before. I owe this to N.R.I."

T. S. NORTON, Hamilton, Ohio, says, "My first job was obtained for me by your Graduate Service Department. Am now Chief Engineer, Station WQOX."

W. R. NIC writes
fro ng in
trol

I'll Train You RADIO-

PRACTICE SERVICING OR COMMUNICATIONS *with Radio Kits I Send*



For both my Servicing Course and my NEW Communications Course, I send you many Valuable Kits of Parts for PRACTICAL EXPERIENCE. They "bring to life" theory you learn in my illustrated texts. Some equipment from both courses is shown below. As part of my Servicing Course, you build a complete, powerful Radio Receiver, a Set Tester useful in earning extra spare time money, an A. M. and F. M. Signal Generator, etc. In my Communications Course, you assemble a low-power Broadcasting Transmitter that shows how to put a station "on the air," a Wavemeter, an Electronic Multitester for measuring voltage, current, resistance, impedance, etc. This and other equipment you build with Kits I send is yours to keep.

Make Extra Money in Spare Time While Learning

Many of my students earn money fixing neighbors' Radios in their spare time while learning, often average $5, $10 a week. I send you SPECIAL BOOKLETS that show you how to do it . . . and I send parts to build a Tester that helps you do it.

SIGNAL GENERATOR
POWER UNIT
SET TESTER
N.R.I. TESTER
MULTITESTER
RANGE SELECTOR
NRI ELECTRONIC MULTITESTER
NRI WAVEMETER
WAVEMETER
MODERN RADIO

AT HOME for Good Jobs in TELEVISION

There is Success--Good Pay--Security for You in America's Fast Growing Industry

Veterans

Get this training under G. I. Bill

Mail Coupon

Want Your Own Business?

Many N.R.I. trained men operate successful Radio-Television sales and service businesses. Let me show you how, starting with spare time earnings as their capital, they build good incomes from their own shops.

TRANSMITTER

Do you want good pay, a bright future, and security? Want your own profitable shop? Get into fast growing, prosperous RADIO-TELEVISION! Radio alone is bigger than ever. 81 million home and auto Radios, 2,700 Broadcasting Stations, expanding Aviation and Police Radio, Micro-Wave Relay, Two-Way Radio are making opportunities for Servicing and Communications Technicians and FCC-Licensed Operators.

Television Is TODAY'S Good Job Maker

In 1949, almost 3,000,000 TV sets sold. By 1954, 20,000,000 TV sets estimated. 100 TV Stations now operating. Authorities predict 1,000 TV Stations. This means more jobs, good pay for qualified men all over the United States and Canada.

No Previous Experience Needed

Keep your job while training. Hundreds of successful RADIO-TELEVISION TECHNICIANS I trained had no previous experience, some only a grammar school education. Learn Radio-Television principles from illustrated lessons. Get PRACTICAL EXPERIENCE. See on the opposite page some of the devices my students build from Kits of Parts I furnish; also practice servicing Radio or operating transmitter . . . experiment with circuits common to Radio and Television. Many of my students make $5, $10 a week extra fixing neighbors' Radios in spare time while training. Many start their own profitable Radio-Television sales and service business, using these earnings as capital.

Send Now for 2 Books FREE— Mail Coupon

Send now for my FREE DOUBLE OFFER. You get actual Servicing lesson to show how you learn at home. Also my 64-page book, "How to Be a Success in Radio-Television." Read what my graduates are doing, earning; see equipment you practice with at home. Send coupon in envelope or paste on postal. **J. E. SMITH, President, Dept. IAC, National Radio Institute, Washington 9, D. C. OUR 37TH YEAR.**

Actual Lesson and 64 page Book BOTH FREE

The ABC's of SERVICING
How to Be a Success in RADIO-TELEVISION

Mail Coupon Now!

MR. J. E. SMITH, President, Dept. 1AC
National Radio Institute, Washington 9, D. C.

Mail me Sample Lesson and 64-page Book, "How to Win Success in Radio-Television"—both FREE. (No salesman will call. Please write plainly.)

NAME...AGE...........

ADDRESS..

CITY...................................ZONE...........STATE.....................

☐ Check if Veteran   Approved Under G. I. Bill

PROTO*
Power Sockorse
. . . for Speed and Force!
BIG NEWS!!
6-Point (Hex) Socket
Double-Square Socket
6-Point Deep Socket
Universal Socket
PROTO Professional Quality ® TOOLS LOS ANGELES

PROTO* Power Sockets Tripled

Fast as a Derby winner and strong as a plow horse, PROTO* power socket wrenches are equally useful with power nut runners and manual attachments. The greatly expanded PROTO* line has many types and designs—to provide the right power horse for your work. Race to your PROTO* dealer and buy the ones you need. Write for catalog to

PLOMB TOOL COMPANY
2256X Santa Fe Ave.,
Los Angeles 54, Calif.

* PROTO means PROfessional TOols. It's the new name for the tools that have been preferred for 43 years.

5086

crafts and hobbies

continued from page 2

Triple-Tiered Table 106

The Great Joiner 108

The Screw-Cutting Lathe 110

Weekend Project 117

Workbench Award Winners 118

How To Make A Spray Hood 120

Vamoose—Outboard Hydroplane . . 122

Around The House 130

Sikorsky Amphibian Model 132

MI Battery Charger 136

Car Care 138

New For The Shop 141

Shop Shorts 142

Machine Your Fishing Reel 144

Monthly Photo Contest 146

Box Camera Synchronizer 147

Shoot 'Em In The Dark 148

Graflex Reducer-Adapter 150

Paper Safe 151

Photo Tips 152

New For The Photographer 153

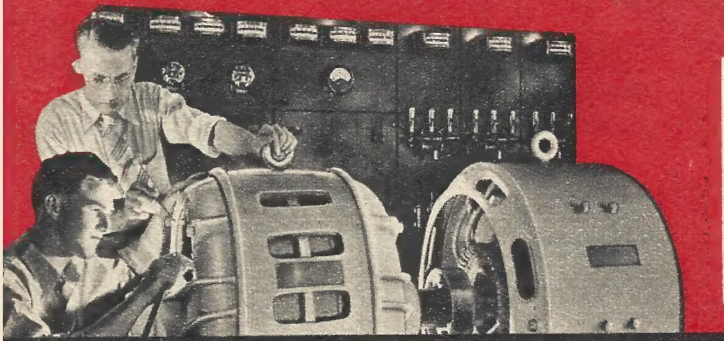
Fundamentals of AC 154

Amateur Telescope Maker's Page . . 157

New For The Boatman 158

THESE MEN ARE GETTING PRACTICAL TRAINING IN ELECTRICITY

On Real:



A.C. and D.C. MOTORS
GENERATORS
SWITCHBOARDS
CONTROLLERS
WIRING JOBS
APPLIANCES
ELECTRONIC UNITS

(Shown at left—Instructor explaining operation and testing of a large Motor Generator in our A.C. Department.)

AND TELEVISION-RADIO

On Real:

TELEVISION SETS
RADIO RECEIVERS
F.M.
(Frequency Modulation)
RECORD CHANGERS
AUTO RADIOS
PUBLIC ADDRESS Systems

(Right—Instructor helping students check the wiring and trace circuits of television receivers.

Just Like YOU Can Get in the Great SHOPS OF COYNE

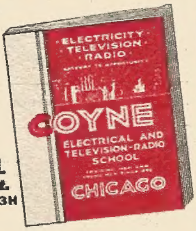
Prepare NOW for a real future the quick, practical way. Come to the Great Shops of COYNE in Chicago. Largest and best equipped school of its kind.

FINANCE PLAN for non-veterans. G.I. Approved. Mail coupon for Big Free Book!

NOT "HOME-STUDY" COURSES! At Coyne you learn on real, full-size equipment. Trained instructors show you how, then you do typical jobs yourself. We don't teach by mail.

CLIP COUPON NOW for big new illustrated Coyne book. Check whether interested in ELECTRICITY or TELEVISION-RADIO or both. No obligation; no salesman will call. Get the facts now!

B. W. COOKE, Pres.
COYNE **ELECTRICAL & TELEVISION-RADIO SCHOOL**
An Institution not for Profit.
500 S. Paulina St., Dept. 11-53H
Chicago 12, Ill.



Mail Coupon for BIG FREE BOOK!

COYNE 52nd YEAR

B. W. COOKE, President
COYNE ELECTRICAL &
TELEVISION-RADIO SCHOOL
500 S. Paulina St., Chicago 12, Ill., Dept. 11-53H

Send BIG FREE book and details of your training offer. This does not obligate me and no salesman will call. I am interested in:

☐ ELECTRICITY ☐ TELEVISION-RADIO

NAME ....

ADDRESS ....

CITY .... STATE ....

1951 GOVERNMENT JOBS!

CHAMPION
ATLANTIC COAST LINE

RAILWAY POSTAL CLERKS

and other Civil Service Positions

Start as high as $3,450.00 a Year

(Veterans Get Special Preference)

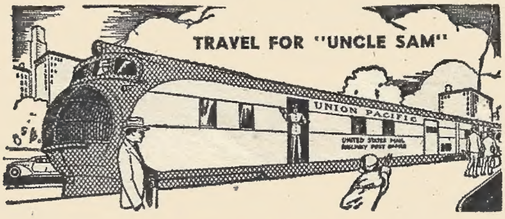
Get Ready Now for 1951 Examinations

City Mail Carriers, Post Office Clerks

Clerks and Carriers now get $2,870.00 the first year of regular employment and automatically increase $100 a year to $3,670.00. Open to Men—Women 18 to 50. Clerks and Carriers can be promoted to other postal positions paying as high as $7,670.00.

Railway Postal Clerks

Railway Postal Clerks get $3,170.00 the first year of regular employment, being paid on the first and fifteenth of each month. ($132.08 each pay day.) Their pay is automatically increased yearly to $3,670.00. Advance may be had to Chief Clerk at $5,970.00 a year. Male Veterans only.


TRAVEL FOR "UNCLE SAM"
UNION PACIFIC
UNITED STATES MAIL RAILWAY POST OFFICE

3 Days On—3 Days Off—Full Pay

Railway Postal Clerks on long runs usually work 3 days and have 3 days off duty or in the same proportion. During this off duty their pay continues just as though they were working. They travel on a pass when on business. When they grow old, they are retired with a pension.

Many Other Positions

Many other positions are obtainable. Rural Carriers—Stenographers—Typists—Patrol Inspectors—Assistant Statistical Clerks—etc. Those wishing these positions should qualify at once.

Get Free List of Positions

Fill out the following coupon. Tear it off and mail it today—NOW, at once.

Although not government controlled, this can result in your getting a big paid government job.

FRANKLIN INSTITUTE, Dept. M-77, Rochester 4, N. Y.

Rush to me, entirely free of charge (1) a full description of U. S. Government Jobs; (2) Free copy of illustrated 40-page book, "How to Get a U. S. Government Job" with (3) List of U. S. Government Jobs; (4) Tell me how to qualify for one of these jobs.

Name ....

Street ....

City.. Veteran?..........

Use This Coupon Before You Mislay It. Write or Print Plainly.

WAR SURPLUS BARGAINS!
STARK'S

WAR SURPLUS BARGAINS

$500,000.00 INVENTORY for QUICK LIQUIDATION

Surplus items—hundreds of them for home, shop, factory, farm and outdoor use. New items, used items, reconditioned items—all at tremendous savings—all priced for quick sale.

Page After Page of Values

This big catalog shows page after page of amazing money saving values. Write for your copy today. Send 10c to cover postage, mailing, etc. Write today!

SEND TODAY FOR YOUR COPY 10c

STARK'S Dept. MI-1 **509 So. STATE STREET CHICAGO 5, ILLINOIS**

FREE SAMPLES!

GLOW IN THE DARK!

BIG PROFITS showing amazing Luminous Specialties—house numbers, pictures, plastic novelties, religious and nursery objects, ash trays, keyholders, etc. Large manufacturer. Enormous demand. Sell on sight. WRITE AT ONCE for FREE samples.
Madison Mills, 303 4th Ave., Dept. T-6, New York 10, N.Y.

High School Course at Home

Many Finish in 2 Years

Go as rapidly as your time and abilities permit. Course equivalent to resident school work — prepares for college entrance exams. Standard H. S. texts supplied. Diploma. Credit for H. S. subjects already completed. Single subjects if desired. High school education is very important for advancement in business and industry and socially. Don't be handicapped all your life. Be a High School graduate. Start your training now. Free Bulletin on request. No obligation.

American School, Dept. H-128, Drexel at 58th, Chicago 37

ENGINEERING DEGREE IN 27 MONTHS

INDIANA TECHNICAL COLLEGE

Aeronautical, Chemical, Civil, Electrical, Mechanical, and Radio Engineering (inc. television). Drafting, 1-yr. Gov't approved for G.I.'s. Low rate. Earn board. Large industrial center. Students from 48 states, 21 countries. Demand for graduates. Enter March, June, September, December. Catalog.
101 E. Washington Blvd., Ft. Wayne 2, Ind.

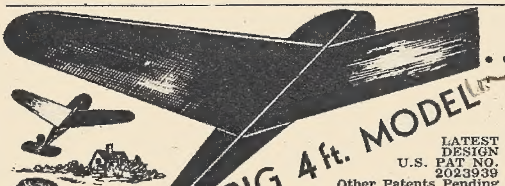
Bar Bells

Buy Direct From Factory

Write for free booklet and price list

$8.95 up

INDEPENDENT IRON WORKS
2416 East 23rd Street, Dept. X3
Los Angeles 58, Calif.



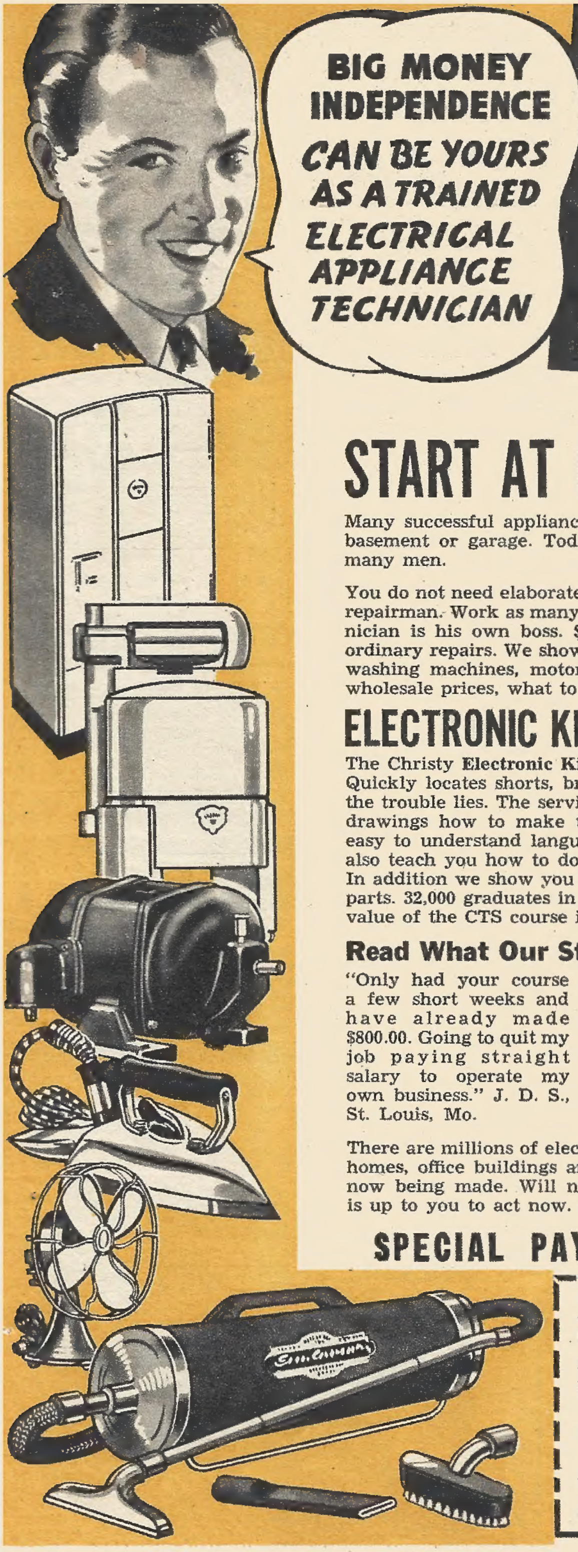
BIG 4 ft. MODEL

LATEST DESIGN
U.S. PAT NO. 2023939
Other Patents Pending

$2.00 complete Postpaid

This 4 ft. wing span model flies like an airplane. Loops—Stunts—Thrills Galore. Complete pre-fabricated parts assembled easily in less than 30 minutes. A truly amazing value.

North East Sales Co. 314 Market St. Dpt. I, Newark, N.J.


BIG MONEY INDEPENDENCE CAN BE YOURS AS A TRAINED ELECTRICAL APPLIANCE TECHNICIAN

LEARN ELECTRICAL EQUIPMENT SERVICING

START AT HOME IN SPARE TIME

Many successful appliance servicemen began in a corner of their Kitchen, basement or garage. Today they own big, profitable businesses employing many men.

You do not need elaborate fixtures or expensive equipment to be a successful repairman. Work as many hours as you wish. The Electrical Appliance Technician is his own boss. **$5.00 to $6.00 per hour** often charged for making ordinary repairs. We show you how to repair refrigerators, vacuum cleaners, washing machines, motors, etc., etc. Where to get needed repair parts at wholesale prices, what to charge for your work, etc.

ELECTRONIC KIT SENT TO ALL WHO ENROLL

The Christy **Electronic Kit,** a multi-purpose trouble detector, is sent to you. Quickly locates shorts, breaks, current consumption, etc. Shows you where the trouble lies. The service manuals we send show you by photographs and drawings how to make the needed repair. Our new course is written in easy to understand language and used by repairmen the country over. We also teach you how to do welding, nickel plating, and general repair work. In addition we show you how to build the power tools you want from spare parts. 32,000 graduates in all parts of the world testify to the soundness and value of the CTS course in Electrical Appliance Repair.

Read What Our Students Say About C. T. S. Training

"Only had your course a few short weeks and have already made $800.00. Going to quit my job paying straight salary to operate my own business." J. D. S., St. Louis, Mo.

"I work day times at the shipyard and after 4:00 PM I operate from my cellar and garage. I average $10.00 to $15.00 clear every day." W. H., Brockton, Mass.

"Thanks to you and others like you I now have the largest and best appliance shop in town. Do work for 7 dealers and 4 other appliance men!" J. V., Boonville, Miss.

There are millions of electrical equipment units in daily use . . . in factories, homes, office buildings and on farms. Millions of new electrical appliances now being made. Will need servicing and eventually will need repair. It is up to you to act now. Get started today.

SPECIAL PAYMENT PLAN—FREE BOOK

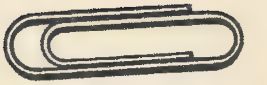
CHRISTY TRADES SCHOOL
4432 N. Kedzie Ave., Dept. D-8806
Chicago 25, Ill.

Please send me FREE ILLUSTRATED BOOK on Electrical Appliance Repairing, facts on your Electronic Kit and Special form for paying later from earnings while learning.

NAME.. Age......

ADDRESS ....

CITY.......................... Zone.... STATE........



$250,000 FOR THIS!

3100 Other Inventions Badly Needed—Big Cash Waiting for Your Little Ideas

IT'S OFTEN the simplest ideas that make the most money! The Kiddie Kar brought its inventor a cool MILLION dollars. A 70-year-old grandmother made $350,000 on an improved overall buckle. The paper clip and the hairpin made fortunes for the people who "dreamed" them up.

You can cash in, too—**if you concentrate on the inventions that are really needed!**

THE EASY WAY TO GET STARTED

Don't waste time and brain-work on something nobody wants! Find out WHAT to invent. This brand-new, revised, and enlarged book by Raymond F. Yates, noted science editor and inventor, lists and describes over 3100 PRACTICAL, money-making ideas that are crying aloud to be invented!

These 3100 ideas are the things **most needed and most likely to make money.** In this comprehensive 352-page book, they are listed under 39 headings for quick reference: Electrical, Television and Radio, Automotive, Agricultural, Building, Household, Toys, Timesavers, etc. Book ALSO lists inventions needed for National Defense and tells how to submit them to U. S. Inventors Council; tells how to think inventively; how to develop an invention STEP-BY-STEP etc.

3100
NEEDED
INVENTIONS

SEND NO MONEY FREE 5-DAY EXAMINATION

Wouldn't you like a slice of the $280,000,000 that American inventors get each year in royalties? Get started now! You don't risk a penny. Simply mail coupon below WITHOUT MONEY—and get Yates' "3100 Needed Inventions" for 5 days FREE TRIAL. If you are not convinced this book can help you make money—just return it and owe nothing. Otherwise, send only $2.95, plus few cents postage, as payment in full.

Any one of the 3100 ideas in this book can bring somebody a fortune. Maybe it can be YOU! Mail coupon at once! Wilfred Funk, Inc., Dept. T 151, 381 Fourth Ave., New York 16, N. Y.

Same FREE 5-Day Offer on "YATES' GUIDE TO SUCCESSFUL INVENTING"

This OTHER book by Ray Yates tells how to **protect, patent, and sell** your inventions. Tells WHERE to go, WHOM to see, and HOW to sell your ideas for the quickest and biggest royalties! (Check proper box in coupon to examine it FREE!)

WILFRED FUNK, Inc., Dept. T 151,
381 Fourth Ave., New York 16, N. Y.

Please send me Yates' 3100 NEEDED INVENTIONS for FREE EXAMINATION. If I keep the book I will send you $2.95 plus few cents postage. Otherwise I will return it within 5 days without further obligation.

☐ Send me Ray Yates' GUIDE TO SUCCESSFUL INVENTING, for 5 days' FREE EXAMINATION. If I decide to keep it I will send you $2.95 plus a few cents postage. Otherwise I will return it, owe nothing.

Name ________________________________

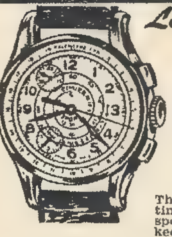
Address ________________________________

City ____________________ Zone No. (if any)___ State__________

☐ Check here if enclosing payment in full WITH this coupon, as per prices above. Then WE pay all postage charges. If you do not want to keep the book (or books) we will promptly refund your money if you mail the shipment back after 5-day examination. **(Canadian Orders: Send 25 cents extra for carrying charges. Only U. S. currency accepted.)**

CHRONOGRAPH WRIST WATCH

$7.50
Plus Tax



Lifetime Guarantee
(EXCLUSIVE OF PARTS)

3 DIALS—5 HANDS—2 BUTTONS

Multi-purpose watch that measures distance, speed, time, moving objects. Used as Stop Watch or Timepiece. Has Sweep-Second Hand for full 60 Second count. Second Dial records up to 45 minutes. Third Dial then records up to 6 hours. Seconds—Minutes—Hours, all recorded automatically.

INDEPENDENT MOVEMENTS

The movement of this fine Swiss Made watch continues to run when sweep hands are stopped. For sportsmen, professional men and women—timekeeper works when other hands and dials are stopped—separate movements permit dual use at same time.

RUGGED CONSTRUCTION

Precision workmanship and shock resistant features are added to enhance the value of this watch. Sold elsewhere for as high as $17.00. Our low introductory price is only $7.50 plus 10% tax. (Total $8.25) Send check or money order and we prepay postage. Or sent C.O.D. plus charges. LIMITED STOCK!

MARDO SALES CORP., 480 Lexington Ave., Dept. C-981, N.Y. 17, N.Y.

HOW to
BREAK
and
TRAIN
HORSES

SEND FOR THIS FREE!

Make money. Know how to break and train horses. *Write today for this book FREE*, together with special offer of a course in Animal Breeding. If you are interested in Gaiting and Riding the saddle horse, check here ( ) *Do it today—now.*

BEERY SCHOOL OF HORSEMANSHIP
Dept. 1151D Pleasant Hill, Ohio

WALKIE TALKIES $3.99 SET OF 2

POCKET SIZE —ELECTRONIC VOICE POWERED

No tubes, batteries, adjustments, license or permit needed! Guaranteed to work anywhere up to ¼ mile with extra wire. Swell for room to room—garage to house, etc! Your own private, talk-listen phone. Not war surplus. Brand new. Guaranteed. Two complete units with wire —READY TO USE!

SEND $1.00 deposit and pay postman $2.99 plus postage charges or send $4.25 for postpaid delivery. Limited Quantity available.

THE MIDWAY COMPANY, Dept. WMI-1, Kearney, Nebraska

LEARN MEAT CUTTING At Home—In Spare Time

Get into the vital meat industry. Concise, practical Home Training based on 25 years proven instruction methods used at National's famous resident school. Prepares you for bigger pay as Meat Cutter, Supervisor, market manager or more money in your own store. Go as rapidly as your spare time permits. Diploma. Start NOW to turn your spare hours into money. Send for FREE bulletin today. No obligation.

National School of Meat Cutting, Inc. Div. ME-70 Toledo 4, Ohio

---

SHOE REPAIR OFFERS BIG INCOME

LEARN IN 12 WEEKS TIME

You can own your own shop or earn big income as skilled shoe repairman. Growing demand everywhere at top wages for men who know how. We teach you quickly by actually working on shoes and modern machines. School open to all from 18 to 60 years of age. **Free Big 24 Page Book** explains everything. Write Dept. MI for your copy today.

MODERN SHOE REBUILDING SCHOOL
Chicago and Los Angeles only **Approved for Vets. Est. 1927**
2937 Belmont Ave., Chicago, Ill. 361 12th St., Oakland, Calif.
806 So. Figueroa St., Los Angeles 14, Calif.

CLEANS WINDOWS
WITHOUT WATER

NEW CHEMICAL MITT

Sensational! DRY Window Cleaner! Uses no water, no messy liquids. Chemically Treated. Simply glide over windows; leaves glass sparkling clear. No heating water, no heavy buckets to carry. No rags, powders, sponges, chamois. No mess or muss. No red chapped hands. Dust, dirt, grime, fog disappear like magic. ***Wonderful for auto windows, windshields!***

SAMPLES TO INTRODUCE Sample offer sent immediately to all who send name at once. A penny postal will do. SEND NO MONEY—*just your name.* **KRISTEE CO., Dept. 776, Akron 8, Ohio.**

GET INTO TELEVISION-RADIO ELECTRONICS By Shop-Method Home Training

MASTER ALL PHASES!

Get Master Shop-Method Home Training from an Established Practical Resident School with its own Training Shops, Laboratories, and Studios—and almost 50 Years of Successful Experience in Training Ambitious Men.

We Bring National Schools To You

GOOD JOBS AWAIT THE TRAINED RADIO-TV TECHNICIAN

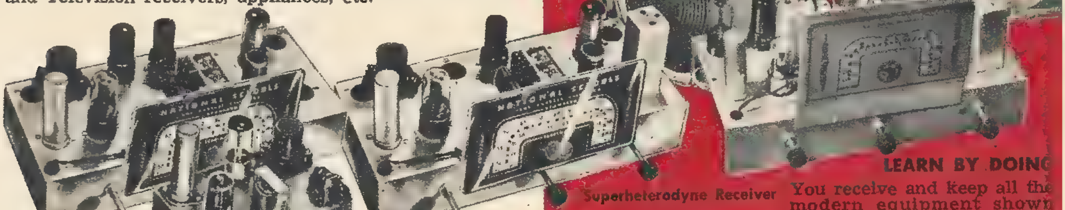
There is a place for *you* in the great Radio-Television-Electronics industry when you are trained as National Schools will train you at home!

Trained technicians are in growing demand at good pay—in manufacturing, broadcasting, television, communications, radar, research laboratories, home Radio-TV service, and other branches of the field. National Schools Master Shop-Method Home Training, with newly added lessons and equipment, trains you in your spare time, right in your own home, for these fascinating opportunities. OUR METHOD IS PROVED BY THE SUCCESS OF NATIONAL SCHOOLS TRAINED MEN, ALL OVER THE WORLD, SINCE 1905.

EARN WHILE YOU LEARN

Many National students pay for all or part of their training with spare time earnings. We'll show you how you can do the same! Early in your training, you receive "Spare-time Work" Lessons which will enable you to earn extra money servicing neighbors' and friends' Radio and Television receivers, appliances, etc.

You also receive this Multitester



Signal Generator

Audio Oscillator

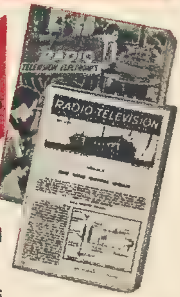
T. R. F. Receiver

Superheterodyne Receiver

LEARN BY DOING

You receive and keep all the modern equipment shown above, including tubes and valuable, professional quality Multitester. *No extra charges.* You build the fine Superheterodyne Receiver with parts we send you.

FREE! These 2 Free Books give you all the facts. Send today for National Schools' new, illustrated Book of Opportunity in Radio-Television-Electronics, and an actual Sample Lesson. No cost—no obligation. Use the coupon now—we'll answer by return airmail.



National Schools Training Is All-Embracing

National Schools prepares you for your choice of many job opportunities. Thousands of home, portable, and auto radios are being sold daily—more than ever before. Television is sweeping the country, too. Co-axial cables now under construction will soon bring Television to every city, town, and farm! National Schools' *complete* training program qualifies you in all fields. Read this partial list of opportunities for trained technicians:

- Business of Your Own • Broadcasting
- Radio Manufacturing, Sales, Service • Telecasting
- Television Manufacturing, Sales, Service
- Laboratories: Installation, Maintenance of Electronic Equipment
- Electrolysis, Call Systems
- Garages: Auto Radio Sales, Service
- Sound Systems and Telephone Companies, Engineering Firms
- Theatre Sound Systems, Police Radio
- And scores of other good jobs in many related fields.

APPROVED FOR VETERANS AND NON-VETERANS
Check coupon below

Both Resident & Home Study Courses offered

NATIONAL SCHOOLS
LOS ANGELES 37, CALIF. • EST. 1905

TELEVISION TRAINING

RADIO TELEVISION

A complete series of up-to-the-minute Television lessons is an important part of your course. They cover all phases of Television repairing, servicing and construction. The same lesson texts used by resident students in our own modern and complete Television broadcast studios, laboratories and classrooms!

FIND OUT NOW... MAIL COUPON TODAY

National Schools, Dept. 1-MI
4000 South Figueroa Street
Los Angeles 37, California

Mail in envelope or paste on penny postal.

Send me your FREE book "Your Future in Radio" and the sample lesson of your course. I understand no salesman will call on me.

NAME__________________ AGE______

ADDRESS__________________

CITY__________ ZONE______ STATE______

☐ Check here if Veteran of World War II

The Editor's Workbench

MI Crafts Editor Bob Brightman, left, and Larry Eisinger, his predecessor and now editor of Fawcett Books, cast their votes for the model cutter which won the 1950 First Army Area crafts contest for M/Sgt. Vic Patacca.

This, That and The Other

As MECHANIX ILLUSTRATED circulation keeps on growing and growing and growing, it's nice to know that we're scoring in the Quality Department as well as in Quantity. Not long ago the American Institute of Graphic Arts—a top-drawer organization founded in 1914 to raise the standards of the graphic arts in the United States—held its first annual Magazine Show. Every outstanding magazine in the country was invited to submit its best issues for the year of 1949. Out of 562 entries, 53 magazines were awarded the AIGA's coveted Certificate of Excellence for the high quality of their design and printing. Among the winners was (y)our favorite magazine, MECHANIX ILLUSTRATED. We're darn proud of the award—and of our genial and exceedingly talented Art Director, Frank Taggart, whose MI art staff made it possible for us to cop the kudos. . . . Letters have begun to trickle in anent the November and December Editor's Workbench pieces about Mimi, my 1929 Model A Ford. Mostly for. (That is, for Model A Fords, not especially for what I had to say about them.) One of the nicest letters comes from Phil Palker of Uniontown, Conn., who owns a *dozen* Model A cars and trucks. He tells me that during the gasoline-rationed war years he used to mix kerosene with his gas, 50-50. The cars ran fine, he says, "but did they smoke!" He advises me to stick to regular gasoline. He also tells me, "The Model A Ford was the best car that ever was made and there are thousands of other people who'll agree with me on that." And he wants me to tell those thousands of people that they can still buy almost everything for a Model A at Sears Roebuck, Montgomery Ward, and Spiegel, the big mail-order houses—a pretty convincing proof of the car's continuing popularity. . . . Quite a few other readers tell me they wish they could lay their mitts on a brand-new Model A. Who doesn't! But, you know, in spite of the loyal affection so many of us feel for the old girl, I wonder whether a 1951 Model A would be successful today in a car market which seems to prefer the great big bathtub-with-marshmallow-tires kind of an automobile? Even if an up-to-date Model A could be delivered for around $750 (which I doubt, labor costs and taxes being what they are) I'm inclined to the opinion that there wouldn't be enough buck-on-the-barrelhead buyers to make it a profitable gamble for some auto maker to revive the old warhorse. I've heard lots of guys say, "Ford could make millions if they brought back the Model A." But I wonder.... Anyway, it was (and it is) a wonderful bundle of automobubble and if I was a poet I'd probably say it something like this:

Some cars had class, some hadn't much,
But one thing you can say:
There'll never be a car to touch
That matchless Model A!

Amen. If you want to know just how many miles behind the times my critical judgment of automobile design runs, take a look at the picture of the supercharged Duesenberg phaeton which decorates the top of page 85. Don't get me wrong—I still love Mimi the Model A. But I think that Duesenberg is just about the most beautiful automobile I ever saw. So now you know.—*Bill Parker.*

NOW . . . GET EVERYTHING YOU NEED TO LEARN AND MASTER

TELEVISION

RADIO-ELECTRONICS . . . AT HOME!

CONTRAST
CHANNEL SELECTOR
VOLUME
H-HOLD
V-HOLD
OFF-ON BRIGHTNESS

Here's the REAL THING!

Use REAL commercial-type equipment to get practical experience

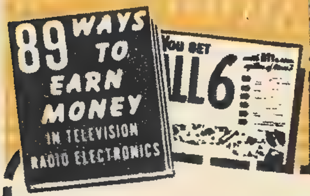
Your future deserves and needs every advantage you can give it! That's why you owe it to yourself to find out about one of the most COMPLETE, practical and effective ways now available to prepare AT HOME for America's billion dollar opportunity field of TELEVISION-RADIO-ELECTRONICS. See how you may get and keep the same type of basic training equipment used in one of the nation's finest training laboratories . . . how you may get real STARTING HELP toward a good job or your own business in Television-Radio-Electronics. Mail the coupon today for complete facts — including 89 ways to earn money in this thrilling, newer field.

ABOVE: Build and keep a real 16 INCH commercial TV receiver. Optional after completing regular training at slight additional cost.

D.T.I., ALONE, INCLUDES BOTH MOVIES and HOME LABORATORY

In addition to easy-to-read lessons, you get the use of HOME MOVIES — an outstanding training advantage — plus 16 big shipments of Electronic parts. Perform over 300 fascinating experiments for practical experience. Build and keep real commercial-type test equipment shown at right

Get BOTH of these information packed publications FREE!



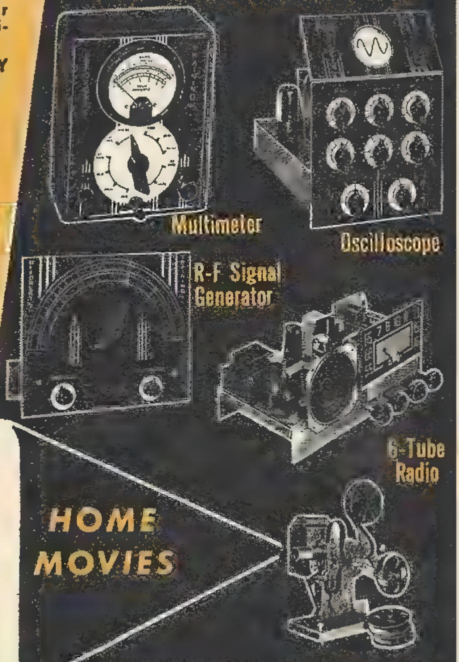
MODERN LABORATORIES

If you prefer, get all your preparation in our new Chicago Training Laboratories — one of the finest of its kind. Ample instructors, modern equipment. Write for details!

MILITARY SERVICE!

If you're subject to military service, the information we have for you should prove doubly interesting. Mail coupon today.

SET UP YOUR OWN HOME LABORATORY



HOME MOVIES

ACT NOW! MAIL COUPON TODAY!

DE FOREST'S TRAINING, INC. Dept. MI-I-H
2533 N. Ashland Ave., Chicago 14, Ill.

Without obligation, I would like your Opportunity News Bulletin showing "89 Ways to Earn Money in Television-Radio-Electronics"; also, the folder showing how I may prepare to get started in this thrilling field.

Name.. Age..........

Address.. Apt..........

City.................................... Zone........ State..........

De FOREST'S TRAINING, INC.
CHICAGO 14, ILLINOIS
A De VRY INSTITUTION

Select DRAFTING FOR A HAPPY and SUCCESSFUL FUTURE

All New Developments
All New Improvements
START with the DRAFTSMAN!

From the building of a pin to the erection of giant skyscrapers DRAFTSMEN are important factors. Before production comes "tooling up" and before tooling first comes Drafting and Designing. Be it mechanical, architectural or structural, draftsmen are needed.

Machines cannot replace the draftsman. His "know how" is needed by all of industry.

This vitally important field in this most highly industrialized country is open to you if you will act.

Consider how the automotive industry redesigns cars year after year. All mass market fields do. Compare yesterday's housing and household goods with today's housing and goods. Then you will see why more draftsmen are always needed.

"The World of Tomorrow" book (illustrated) is yours for the asking. Learn the opportunities offered by Drafting and Blue Printing. Your future may depend upon it. Act today.

BIG MONEY

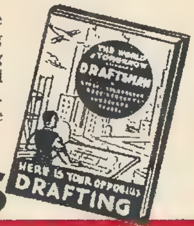
SALARIES

Trained draftsmen command big wages. Are constantly needed to create new products, improve current methods. The "Draftsman's know how" saves thousands of dollars, saves thousands of hours. He is well paid.

YOUR OWN BUSINESS

Independence, Security is yours when you head your own drafting or engineering firm. Again it is "know how" that pays you big profits, year in—year out. Makes you always in demand.

Learn drafting at home in your spare time the new improved CHRISTY way. By working with actual problems. Actually designing equipment. Trained by making drawings and mastering all types of drafting problems. Christy graduates are ready for immediate employment as skilled draftsmen.



SEND FOR THIS FREE BOOK TODAY!

CHRISTY TRADES SCHOOL, Dept. DB-502
4432 N. Kedzie Ave., Chicago 25

Rush me FREE book "The World of Tomorrow" and how your Home Training professional Drafting Instruments, Drafting Table, Drafting Equipment can be had on a PAY AS YOU LEARN plan.

NAME.. Age.......

ADDRESS ....

CITY.. STATE.............

WE GIVE YOU!

- Professional Drafting Set (complete)
- Draftsmen's Table (Portable & Folding)
- Lesson Manuals
- T-Square Tru-Edge
- Transparent Angles 45°, 60°
- French Curve, Shield, Compass
- Drawing Paper, Ink, Pencils, etc.

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

CLARENCE A. O'BRIEN & HARVEY JACOBSON

Registered Patent Attorneys

13-A DISTRICT NATIONAL BUILDING
WASHINGTON 5, D. C.

EARN MORE IN DRAFTING

More Opportunities for Employment and Promotion

"Here I am at work making good money as a draftsman. I'm glad I sent the coupon to Chicago Tech for that Free Trial Lesson and found out how easy it is to learn Drafting in spare time at home. Today I feel secure in my job because the draftsman's work comes first on any new project. And, in addition, draftsmen can't be replaced with machines. What's more, I feel I'm slated for promotion and more pay, because I see so many draftsmen advancing to high-pay jobs."

LEARN IN SPARE TIME—AT HOME!
(or at the College in Chicago)

A few hours of pleasant home study every week—that's all. No interference with your present job. All the tools you need; drawing outfit included. With Chicago Tech's help, you train yourself step by step. This tested method—developed over 46 years of C.T.C. progress—prepares men quickly for good positions in industry.

FREE INFORMATION—SEND COUPON

FREE TRIAL LESSON

To prove to you how easy it is to learn Drafting at home by the Chicago Tech method, we will send you this FREE TRIAL LESSON. No charge for this lesson, now or later. Fill out and mail coupon, or send post card today.

CHICAGO TECHNICAL COLLEGE

A-275 Tech Bldg., 2000 So. Michigan Ave., Chicago 16, Illinois
Mail me FREE Lesson with information about big opportunities in DRAFTING.

Name.. Age......

Address ....

City................................ Zone.... State..........

I need 500 Men to wear SAMPLE SUITS!

Pay No Money—Send No Money!
My plan is amazing! Just take a few easy orders for my sensational values in made-to-measure suits. Get your own suits WITHOUT A PENNY COST and make money too! Men can't resist the outstanding style, long wear and low price of my made-to-measure suits. You need no experience. Spare time pays big profits. Rush name and address today for complete details, big FREE SAMPLE OUTFIT contains more than 100 actual woolen samples, style illustrations, etc. Write today!

W. Z. GIBSON, Inc., Dept. N-484
500 South Throop St., Chicago 7, Illinois

STUDY AT HOME

WITH AN EDUCATIONAL INSTITUTION

Courses in ARTS AND SCIENCES: Philosophy; Education; Letters; Public Health; Medical Jurisprudence; Psychology; Sociology; Physics; Chemistry; Geology; Pol. Science; Theology; Law; Business and Commerce; Accounting; Mathematics; Statistics; Agriculture.

Courses in ENGINEERING: Electrical, Civil, Mechanical, Drafting, Architectural, Automotive, Steam, Diesel, Aeronautical, Radio, Structural, Mining, Industrial, Petroleum, Marine, Refrigeration, Air Conditioning, Chemical. Send for free catalog.

McKinley-Roosevelt Incorporated, 4610-D4, Sheridan Rd., Chicago 40, Illinois

MONEY IN HAMSTERS

The new wonder animals from Syria. Often called Toy Bears. Delightful pets. Everyone wants them. Laboratories use thousands. Clean, odorless. Raise anywhere. NOW, spotted and golden breeds. We supply breeders, equipment, instructions. Write today for free picture folder.

GULF HAMSTERY, 1553 Basil St., Mobile 17, Ala.

LEARN MEAT CUTTING AT NATIONAL
Pay After Graduation

The steady dependable trade of Meat Cutting taught easily in 8 short weeks. You LEARN BY DOING under actual meat market conditions in big modern school at Toledo.

For beginners or men with experience. Get a profitable store of your own. Remember, PEOPLE MUST EAT! Big pay jobs. Free employment help. Thousands of successful graduates.

Buying, cutting, percentage, pricing, advertising, selling, etc. A complete retail meat education. National School established over 25 years. Get National training NOW. Pay your tuition in easy weekly payments after you graduate. G. I. approved. Send coupon for FREE 52 page school catalog—TODAY.

National School of Meat Cutting, Dept. 52-N, Toledo 4, Ohio

Send me your FREE school catalog on National Training at Toledo in Meat Cutting, Meat Merchandising and Self Service Meats. No obligation. No salesmen will call.

Name ....

Address ....

City.. State...........
( ) Check here if Veteran of World War II

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

McMORROW, BERMAN & DAVIDSON

Registered Patent Attorneys

PATENTS • COPYRIGHTS • PATENTS

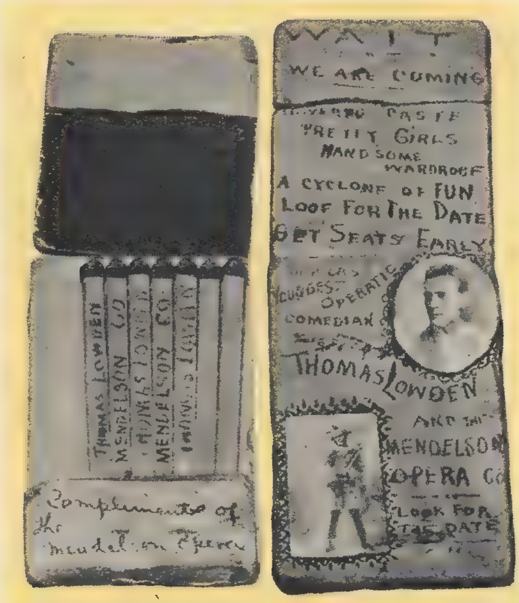
139-L VICTOR BUILDING, WASHINGTON 1, D. C.

Invention Clinic

Joseph H. Kraus

Paper Match Book Problem

Today's paper match book is widely used but often condemned. In its most popular style, two rows of die-cut, specially treated paper strips are tipped with a chemical mass which ignites by friction and chemical combination when rubbed against a striking surface generally found on a wrap-around cover.



Joshua Pussey's first book of safety matches patented in 1892 had striking surface on inside, left. Outside told of coming of Mendelson Opera Co.

Sometimes the entire book of matches goes off in the hands of the user when a spark falls on other unused matches. This even happens at times when careful attention is given to the admonition "Close cover before striking." It requires no stroke of genius to realize that what is needed is an invention which will effectively prevent this from happening.

But there is more to the problem than just this. Any new design must be adaptable to modern paper-match-making machinery, and to the mechanical devices which pack the matches into boxes. It must not increase costs of production—preferably it should reduce them.

Remember that matchmaking machines represent an investment of millions of dollars. They have been developed over a period of many years. No radical change would be welcome unless material saving in costs of production were possible to amortize the costs of new equipment. Even then, interim production should allow for continuous sale in a highly competitive market with inventor's royalties and interest on borrowed money included in the costs. It must be worth the manufacturer's risk to make the change-over and investment.

Many inventors have attempted to accomplish all this and practically all of them have failed in their attempt.

Pull Matches

During recent years there has been developed an element of safety not found in the regular book match—the pull match which was first protected (in its present style) by Rodney S. Pullen in 1932.

While the original pull-type match dates back to an early time in the history of the Patent Office and probably was first protected way back in 1880, the new feature of Pullen's invention is that the matches have a sort of jump space of retardation. It's produced by adhesive material or by die stamping alongside the match heads "for insuring involuntarily a proper speed for ignition."

Thus, you must pull on the unprepared end of the match. This zips the head past the striking surface, ignites the match and insures that the other matches in the holder will not take fire.

Strictly Advertising

Another popular style of paper match is more an effective advertising medium than a departure from regular practices. Here we find a shaped, die-cut body which reproduces a picture of the advertiser's product or his activities. Thus there may be a miniature cigar, bottle or hat. This was protected by J. O. Trautwein of Chicago in 1931.

Background

With these types in mind, let's look into a few of the many hundreds of patents which have been given over to improving the simple paper match, exclu- [*Continued on page 20*]

GET INTO DIESEL-AUTO MECHANICS *Master All Phases*

JOBS LIKE THESE ARE AVAILABLE TO *TRAINED* MECHANICS. CHOOSE THE FIELD YOU LIKE BEST

Get Complete Training

Diesel Fuel Injection
Automotive Motor Tune-up
Diesel Engine Rebuilding
General Garage Mechanic
Agricultural Implements
Auto Engine Rebuilding
Auto Elec. Service
Public Utilities
Parts Dealers
Bus & Truck Lines
Industrial Maintenance
Contracting & Excavating
Business of Your Own
AND many other similar openings.

As a National Schools graduate, you are trained for *ALL* opportunities in the Diesel & Auto Industries

EARN WHILE YOU LEARN

With our practical Master Shop-Method Home Training, you study at home in your spare time. You receive Spare Time Work Lessons, which show you how to earn while you learn . . . for extra money and experience. You learn by DOING.

TOOLS AND EQUIPMENT

To make your training complete, we give you selected mechanic's tools and equipment, illustrated below, including all-metal tool-box—as a regular part of your instruction.

AUTOMOTIVE
DIESEL
ALLIED MECHANICS

Shop-Method *Home Training* by an Established Resident School Prepares you for *Many Good Jobs*

Opportunity is everywhere for the trained Diesel-Auto Mechanic. Highways throng with cars, busses, trucks, tractors. Garages and Service Stations are kept busy. Factories, ships, farms, railroads, general industry, are dependent upon engine power. Here's a dynamic, fast-growing field that needs trained men who know *ALL* phases: installation, operation, maintenance and repair. Now—National Schools offers you a *practical, all-embracing* Diesel-Auto Mechanic's Course, including all of these advantages:

Complete training, covering—Diesels, High Speed and Heavy Duty; Semi-Diesels, Gasoline and Special Fuel Engines AND Allied Mechanics.

Basic Lesson Texts
Diesel Installation
Operation-Maintenance
Diesel Chart Manual
Spare Time Lessons
Engine Service Manuals
Engine Repair
Drive Systems
Diesel Electric Power
Thermodynamics

TOOLS AND EQUIPMENT

INVESTIGATE
Secure Full Information

Both Resident and Home Study Courses Offered

NEW, ILLUSTRATED BOOK & SAMPLE LESSON SHOW HOW WE TRAIN YOU...SEND FOR THEM TODAY!

NATIONAL SCHOOLS
DIESEL
YOUR FUTURE IN AUTOMOTIVE AND ALLIED MECHANICS
Diesel

NO COST

NO OBLIGATION

APPROVED FOR VETERANS
Check coupon below

NATIONAL SCHOOLS
LOS ANGELES 37, CALIF. • EST. 1905

FIND OUT NOW...MAIL COUPON TODAY

NATIONAL SCHOOLS, DEPT. I-MID *(Mail in envelope or paste on penny postcard)*
4000 South Figueroa Street
Los Angeles 37, California

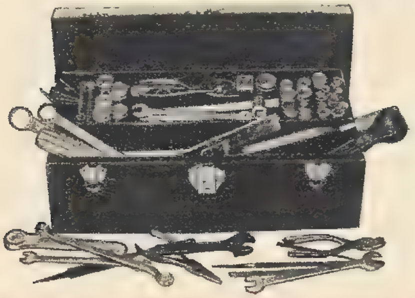
Mail me FREE the book, YOUR FUTURE IN DIESEL-AUTO MECHANICS, together with the Sample Lesson. I understand I may keep and use the information with no obligation.

Name ______________________________ Age ________

Address ______________________________________

City ______________________ Zone ______ State ______

Check here if Veteran of World War II D



WE GIVE YOU TOOLS OF YOUR TRADE

INVENTORS

If you consider your invention to be something of importance—if you have invented any new and useful art, machine, manufacture or composition of matter or improvement thereof—you are advised to protect your invention by applying for a U. S. patent.

A patent is a valuable right. It grants you a monopoly—the right to exclude others from making, using or selling your invention as claimed for a term of seventeen years.

The specification and claims of a patent, particularly if the invention be at all complicated, constitute one of the most difficult legal instruments to draw with accuracy. Therefore, unless you are thoroughly familiar with such matters, you are advised to employ a competent registered patent attorney or agent.

This firm is registered to practice before the U. S. Patent Office and is available to assist in the preparation and prosecution of your patent application.

The "Evidence of Invention" form mentioned below is offered as a convenience to you in making your disclosure to us for search purposes.

You should date and sign your disclosure and have it witnessed by two or more persons who are capable of understanding your invention.

Your disclosure should be mailed to us together with a letter authorizing us to conduct a preliminary search among previously granted U. S. patents for similar types of invention.

We then make this search and prepare a report of the probable patentability of your invention. If such report is favorable, we recommend the further course for you to take.

The "Evidence of Invention" form and booklet are suggested as conveniences to you and us in starting action on your invention.

VICTOR J. EVANS & Co. Merlin M. Evans
REGISTERED PATENT ATTORNEY
650-A MERLIN BUILDING, WASHINGTON 6, D. C.

We shall be glad to send you promptly and without obligation, an instructive booklet, "Patent Protection for Inventors", which was prepared to give inventors detailed information and steps to take toward patent protection—also our convenient "Evidence of Invention" form. Use address Victor J. Evans & Co., 650-A Merlin Building, Washington 6, D. C.

PATENTS COPYRIGHTS

Invention Clinic

[*Continued from page* 18]

sive of the patents devoted to match-production machinery. Perhaps the first flexible cover, as applied to match books, was protected by J. V. Jones in 1883. At that time inventors were paying considerable attention to the pull-match idea, although there were not as many patents issued in those days.

It may be that the first paper match sprang from the idea covered by Joshua Pussey of Lima, Pa. The patent was issued in 1885—but this was not a match at all. It was listed as "Bengal Lights" and was a die-cut, impregnated cardboard, arranged in book form, intended for use as colored lights. In those days it was sporting to have fireworks and colored, fire-lighted parades. In 1892, Pussey also patented the first safety matchbook.

A rather fancy, folding cover for pull-style matches was granted a patent in 1894. And Charles W. Oertel of New York, protected the idea of placing the striking surface on the inner face of the cover in 1908.

In 1915 a patent was issued to Cesare Campus of New York for placing the striking surface on the bottom of the outside flap so that it could tip in under the fold. Then Lucian E. Parker, of Wadsworth, Ohio, decided that it would be a good idea to hold the bottom fold in place and keep the matches inside the book by running through a simple staple.

In the meantime, several patents had been issued to various inventors to cover matches arranged in star-shaped formations so that they could be rotated out of the package. There were also strip forms for swinging outward and other styles with similar purposes.

Then O. J. Friedman decided that the proper position for the striking surface should be on the back of the folder, so a patent was allowed him in 1916 for this idea.

The first reference to the need for some method to protect the user from the danger of having the book go up in flames occurred in a patent issued to J. F. Nolan of Yonkers, N. Y. His invention called for an inside flame-proof cover which should be closed before striking.

Further attention was given to this situation by J. B. Ramirez of Warren, N. J., when he protected a matchbook which would unfold completely. Thus the match heads were far from the striking surface. However, he furnished no assurance that the users would let the strips dangle while striking the matches.

Individually compartmented matches of the pull variety, arranged to be torn from continuous perforated strips, comprised the design for which C. I. Pfersch of Barberton, Ohio, got his patent in 1923.

[*Continued on page* 24]

FILL THE GAPS IN YOUR TRAINING

No one goes into a job perfectly prepared. Sooner or later the "weak spots" are bound to show up. And when they do, the successful man is quick to recognize them, *quick to fill the gaps.* International Correspondence Schools can help you get whatever training *you* may need. You have some 400 famous, spare-time I.C.S. Courses to choose from. Or, if you wish, brief "refresher" courses, advanced lessons, or special instruction combining one or more specific business or technical subjects can be *tailored* to fit your needs. The coupon below brings full information without obligation. Mark and mail it today!

INTERNATIONAL CORRESPONDENCE SCHOOLS

APPROVED under the G.I. BILL

BOX 2321-X, SCRANTON 9, PENNA.

Without cost or obligation, please send me full particulars about the course BEFORE which I have marked X:

Business and Academic Courses
- ☐ Accounting ☐ Advertising
- ☐ Bookkeeping
- ☐ Business Administration
- ☐ Bus. Correspondence ☐ Bus. Law
- ☐ Certified Public Accounting
- ☐ Commercial ☐ Commercial Art
- ☐ Cost Accounting
- ☐ Federal Tax
- ☐ First Year College
- ☐ Foremanship ☐ French
- ☐ Good English ☐ High School
- ☐ Higher Mathematics ☐ Illustration
- ☐ Industrial Supervision
- ☐ Motor Traffic ☐ Postal Civil Service
- ☐ Retailing ☐ Retail Bus. Management
- ☐ Salesmanship ☐ Secretarial
- ☐ Sign Lettering ☐ Stenography
- ☐ Spanish ☐ Traffic Management
- ☐ Typing

Air Conditioning and Plumbing Courses
- ☐ Air Conditioning
- ☐ Heating ☐ Plumbing
- ☐ Refrigeration ☐ Steam Fitting

Chemical Courses
- ☐ Chemical Engineering
- ☐ Chemistry, Analytical
- ☐ Chemistry, Industrial
- ☐ Chemistry, Mfg. Iron & Steel
- ☐ Petroleum Refining ☐ Plastics
- ☐ Pulp and Paper Making

Civil Engineering, Architectural and Mining Courses
- ☐ Architecture ☐ Architectural Drafting
- ☐ Building Estimating
- ☐ Civil Engineering ☐ Coal Mining
- ☐ Contracting and Building
- ☐ Highway Engineering
- ☐ Lumber Dealer
- ☐ Reading Structural Blueprints
- ☐ Sanitary Engineering
- ☐ Structural Drafting
- ☐ Structural Engineering
- ☐ Surveying and Mapping

Communications Courses
- ☐ Electronics
- ☐ Prac. FM and Television
- ☐ Prac. Telephony ☐ Radio Operating
- ☐ Radio, General ☐ Radio Servicing
- ☐ Telegraph Engineering

Electrical Courses
- ☐ Electrical Drafting
- ☐ Electrical Engineering
- ☐ Electric Light and Power
- ☐ Lighting Technician
- ☐ Practical Electrician
- ☐ Power House Electric
- ☐ Ship Electrician

Internal Combustion Engines Courses
- ☐ Auto Technician ☐ Aviation
- ☐ Diesel-Electric
- ☐ Diesel Engines ☐ Gas Engines

Mechanical Courses
- ☐ Aeronautical Engineer's, Jr.
- ☐ Aircraft Drafting ☐ Flight Engineer
- ☐ Forging ☐ Foundry Work
- ☐ Heat Treatment of Metals
- ☐ Industrial Engineering
- ☐ Industrial Instrumentation
- ☐ Industrial Metallurgy
- ☐ Machine Shop
- ☐ Machine Shop Inspection
- ☐ Mechanical Drafting
- ☐ Mechanical Engineering
- ☐ Mold-Loft Work
- ☐ Patternmaking—Wood, Metal
- ☐ Reading Shop Blueprints
- ☐ Sheet-Metal Drafting
- ☐ Sheet-Metal Worker ☐ Ship Drafting
- ☐ Ship Fitting ☐ Tool Designing
- ☐ Toolmaking
- ☐ Welding—Gas and Electric

Railroad Courses
- ☐ Air Brake ☐ Car Inspector
- ☐ Diesel Locomotive
- ☐ Locomotive Engineer
- ☐ Locomotive Fireman
- ☐ Locomotive Machinist
- ☐ Railroad Section Foreman
- ☐ Steam and Diesel Loco. Eng.

Stationary Engineering Courses
- ☐ Boilermaking
- ☐ Combus. Engrg. ☐ Engine Running
- ☐ Marine Engineering
- ☐ Power Plant Engr. ☐ Steam Engineer

Textile Courses
- ☐ Cotton Manufacturing ☐ Loom Fixing
- ☐ Rayon Weaving ☐ Textile Designing
- ☐ Woolen Manufacturing

Name__________ Age_____ Home Address__________

City__________ State__________ Working Hours_____ A.M. to_____ P.M.

Present Position__________ Employed by__________

Length of Service in World War II__________

Enrollment under G.I. Bill approved for World War II Veterans. Special tuition rates to members of the Armed Forces.
Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.

Dear Editor

Use this letters column as you see fit—make it a complaint box, question box, suggestion box or even a soap box. But use it! Our only requirement is that you sign your name and keep 'em short, interesting and clean. Address mail to: MECHANIX ILLUSTRATED, Letters Editor, 67 West 44th Street, New York 18, N. Y.

Shutterbug In Action

My two-month-old daughter Katherine Ann happened to be reading MI one day and noticed the pictures you ran of all those youngsters reading the magazine. Being the youngest of all, she was highly disgusted.

Mrs. Jerome Delfeld
Brownsville, Wis.

Probably highly uncomfortable, too, what with papa's foot in her back to hold her up (look behind tree). At least he took off his shoe (see circle).

Formula For Movies

Could you please help me?

I like to go to the movies but in my town you have to sit through at least 20 minutes of advertisements before you see the complete show.

Could you tell me some way to interfere with these ads when they come on so I won't have to watch them?

W. G. Mooney
Ottawa, Ill.

Have you tried closing your eyes?

Don't Notch That Seal

Our Service Department has called our attention to an article in the July issue of MI (Car Care, page 132) which reads: "Ford recommends that a small notch be cut on the seal of the radiator cap to prevent excess pressure from building. Too much pressure will force water into the overflow pipe."

Our Engineering Department does not agree with this statement as they insist that the radiator cap was designed to build up pressure which should not be released except by the automatic control incorporated into each cap. They suggest that any alteration in the seal . . . would completely change the proper functioning of the pressure cap.

William T. Gosset, V. P.
Ford Motor Co.
Dearborn, Mich.

Mimi Vs. Betsy

Bill Parker can have his Mimi, I'll take my Betsy any day. Last summer she thought nothing of rolling up 10,000 miles on your A-1 (?) highways. The only mechanical trouble we encountered was a stripped timing gear which cost 11 bucks.

PORT ALBERNI
B.C.
To
MIAMI, FLA.
ALL THE WAY
BY MODEL 'A'

What say we get together and ask Henry Ford to start building the Model A again?

Ted Stocker
Port Alberni, B. C.

[*Continued on page* 28]

Now! YOU CAN MAKE MONEY . . .

TURNING WORTHLESS OBJECTS INTO GOLDEN TREASURES—

. . . *BY METALIZING!*

HERE ARE JUST A FEW OF THE HUNDREDS OF ARTICLES THAT CAN BE RESTORED BY REPLATING—INCREASED IN VALUE—OR "ETERNALIZED" AS KEEPSAKES WITH A COATING OF EVERLASTING BRONZE, STERLING SILVER, OR 14 KARAT GOLD.

Costume Jewelry from flowers, insects, shells, and leaves.

Ash trays, paper weights, from leaves, fruit, vegetables.

Metalize busts, figure, from plaster cast or wood carvings.

Metal plate object of glass, cloth, leather, plastic or rubber.

Eternalize Baby Shoes, Toys, and other sentimental mementoes.

Metalize baskets, plates, ceramics and other non-metallic objects.

Preserve sports and war trophies in solid Bronze, Silver or Gold.

YES—ANY MAN OR WOMAN CAN DO WORK LIKE THIS IN ONE CORNER OF THE KITCHEN OR IN ANY SPARE ROOM!

Make $\$5^{00}$ An Hour For Your Spare Time!

Amazing book tells you how

HOW to do the work—how to get customers coming to you—how to set up the simple equipment — how and where to buy the materials—what to charge — how to start in spare time—how to expand into a full time business whenever you wish. Shows you in pictures and words how to put a coating of pure metal on such things as flowers, leaves, insects, shells, wood carvings, plaster castings, busts, statues, religious figures, buttons, baskets, feathers, base balls, golf balls, mementoes of all kinds, such as, baby shoes, party and wedding favors and decorations. Operating a home metalizing business is one of the greatest insurance policies a man could ask for his future. Read about it without risking a penny.

OWN YOUR OWN HOME-OPERATED BUSINESS

Think of turning 56 cents worth of materials into a profit of $5.00 and over for just a few minutes of easily learned handiwork. Sounds fantastic? . . . Yet it is absolutely true . . . AS YOU CAN QUICKLY PROVE TO YOURSELF.

AN EXCITING NEW OPPORTUNITY

Just at a time when hundreds of men and women would like to make an extra $35.00 to $50.00 a week in spare time home work, the old—established—and highly profitable Metalizing Business has been turned into a home-work money-maker. Where in the past a few big companies have been making fortunes, now hundreds of smaller home operators can become independent. I have ready to send you a complete set of simple instructions by which anyone — regardless of age or education — can learn the fascinating art of metalizing. By this process you can replate worn objects in silver, copper, or real gold—you can change silver to gold by overplating—you can even deposit a heavy coating of solid metal on non-metallic objects such as baby shoes, golf balls, toys and other precious keepsakes—or you can take inexpensive articles and make them worth 10 to 20 times their cost by jewel plating with precious metals.

ALL THIS INFORMATION IS FREE

The information is free. A stamp brings you the details of the exact plan by which hundreds are NOW MAKING EXTRA MONEY EVERY WEEK. Study it over. Analyze the possibilities. Then if you don't think it's made to order for you —your only loss is your 3c stamp. You can read every fact, every secret, every step of the instructions—all at my risk.

NO "CATCH" TO THIS OFFER DON'T SEND ME A PENNY . . . *Just Your Name!*

Learn about this wonderful "Ace in the hole". See how you can start without risking job or pay check — how you can turn spare hours into $5.00 bills — how you can actually have fun making money in a business that all the family can help with. No charge now or at any time for the complete facts about this permanent lifetime business that has now opened its door to home operation. Scores of men and women have already started . . . Plenty of opportunity for hundreds more. BUT DON'T PUT IT OFF. Send your name and address TODAY . . . It may open new horizons in your life.

R. E. Brandell, Warner Electric Co., 1512 Jarvis, Dept. 61, Chicago 26, Ill.

R. E. Brandell, Warner Electric Co.
1512 Jarvis, Dept. 61, Chicago 26, Ill.

Rush complete facts showing how the old and profitable Metalizing Business has now been converted into a homework money-maker for full or spare time. No charge or obligation for the information you send.

Name ______________________

Address ______________________

City ______________ *Zone* ___ *State* ______

INVENTORS

Before you make any effort to market your invention, you should take the first steps toward proceeding for patent protection.

The usual first step is to have a search of the U. S. patent records conducted, so that I can report to you on the question of patentability.

I shall be pleased to furnish you with information relative to patent procedure upon request from you, and this will be without any obligation on your part.

PATRICK D. BEAVERS
(Formerly RANDOLPH & BEAVERS)
Registered Patent Attorney
923 Columbian Building Washington 1, D. C.

PATENTS
C. A. SNOW & CO.
REGISTERED PATENT ATTORNEYS
WRITE FOR INFORMATION TO
427 SNOW BUILDING, WASHINGTON 1, D. C.

INVENTORS

Whether an invention is patentable can be substantially determined by a search of the U. S. Patent records. Without obligation, write for information explaining the steps you should take to secure a patent.

JOHN N. RANDOLPH
Registered Patent Attorney
209 Columbian Building Washington 1, D. C.

INVENTORS

IF YOU WISH TO PROTECT YOUR INVENTION
YOU SHOULD TAKE STEPS TO PROTECT IT BY A U.S. PATENT
WRITE ME FOR "RECORD OF INVENTION" FORM

CARL MILLER
REGISTERED PATENT ATTORNEY
WOOLWORTH BLDG., 35th FLOOR, 11B
NEW YORK CITY

Invention Clinic

[*Continued from page 20*]

Tricky Designs

Many other patents followed with the striking surface arranged in many different ways. On one, the surface was a hollow channel located at about the position where the manufacturer's name usually appears. Another had a double striking strip between which the match head was to be inserted. Finger pressure had to be applied and the match pulled. A third had an oval window either front or back of the cover behind which the striking surface was arranged. Obviously the inventor never tried the article or he would have discovered that the window did a fine job of increasing danger by breaking off matches.

Several patents are calculated to expose the striking surface only after the book is closed. This is accomplished by trick folds or paper-spring action. Holders also are provided to permit removal of only one match at a time.

A tricky book design appeared in a patent issued to H. B. Eastman in 1938. In this, the matches pop into view through a slit when the head end of the cover is pressed down.

All manner of variations may be found. There's a combination match and cigar, match and cigarette, match and cigarette package. Also patented are a system for feeding a cigarette and match at the same time, a combination match and toothpick book, a small place card and matches combination and one which houses a memo pad and stocks lucifers.

Other Angles

Perhaps the final answer will lie in another direction. A 10,000-light match has been developed. This is a chemical unit in the form of a very thin pencil. A small pocket clip contains the striking surface and the clip is removed

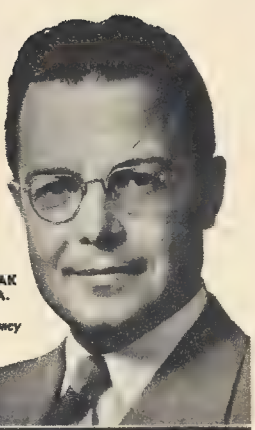
[*Continued on page 26*]

MI SUBSCRIBERS: CHANGING YOUR ADDRESS?

If you are moving, please notify Subscription Department, MECHANIX ILLUSTRATED, Fawcett Building, Greenwich, Conn. If you have an *old* address label from a recent copy, send that along with your full name and *new* address (including P. O. zone number). If old address label is not handy, write your former address in the letter of notification.

Also, *before moving* be sure to notify your *present* Postmaster of your change of address. The Post Office Department requests this. Allow five weeks for new delivery.

Let me send You FREE PROOF
that you can become an expert
ACCOUNTANT...BOOKKEEPER OR C.P.A.

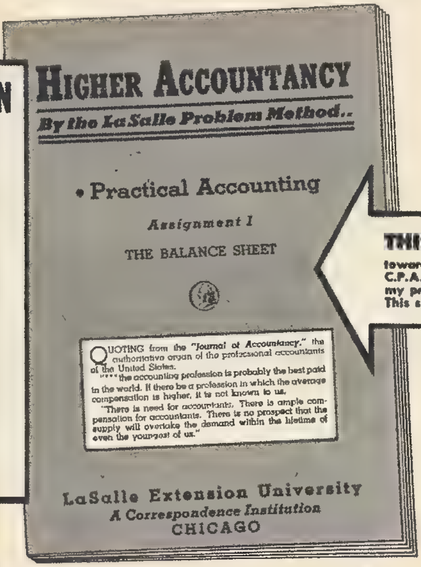


LOWELL C. DOAK
C. P. A., M. B. A.
Director of
LaSalle Accountancy
Instruction

FREE SAMPLE LESSON

I offer you this free sample lesson so that you can *prove to yourself* that you CAN master Accountancy—quickly, thoroughly—in spare time at home.

You will see exactly how LaSalle's famous "Problem Method" works . . . how you are led step-by-step through actual accounting work—*learning by doing* and not by study of theory alone. First you tackle easy problems, then more difficult ones—until soon you master them all. And at every step you have the close personal guidance of LaSalle's large staff of C.P.A. instructors.



HIGHER ACCOUNTANCY

By the LaSalle Problem Method..

• Practical Accounting

Assignment 1

THE BALANCE SHEET

QUOTING from the *"Journal of Accountancy,"* the authoritative organ of the professional accountants of the United States:

"*** the accounting profession is probably the best paid in the world. If there be a profession in which the average compensation is higher, it is not known to us.

"There is need for accountants. There is ample compensation for accountants. There is no prospect that the supply will overtake the demand within the lifetime of even the youngest of us."

LaSalle Extension University
A Correspondence Institution
CHICAGO

THIS SAME LESSON STARTED ME

toward a well-paid public accounting career—and my C.P.A. degree. I knew nothing of accounting before—yet my progress was rapid—my earning power climbed fast. This sample lesson will show you why.

Nearly 10% of all C.P.A.'s in the U. S. have been trained by the LaSalle Problem Method

IF you have been envying the high incomes and good jobs enjoyed by thousands of men and women Accountants today . . . incomes ranging from $4,000 to $10,000 and more per year . . . why not launch such a career for yourself?

Do you doubt that you can?

Then let me send you—without cost or obligation—the same Lesson Number One with which LaSalle has started several hundred thousand men and women toward successful accounting careers. I want you to see for yourself how this remarkable method, originated by LaSalle, makes Accountancy simple, interesting, practical, and certain . . . how it leads you step-by-step to a complete mastery of Accounting—and on up to the coveted degree of Certified Public Accountant if you so aspire.

It doesn't matter whether you've had previous bookkeeping experience, or whether you don't know a debit from a credit. Whether you wish to qualify as an expert bookkeeper, advanced accountant, cost accountant, auditor, government accountant, income tax specialist, or public accountant . . . you'll find in LaSalle's Problem Method the exact plan to prepare you rapidly and inexpensively—in spare hours at home—without losing a day from your present job.

So right now, today . . . if you are an adult, employed, and earnestly ambitious for rapid advancement in this highest-paying of all professions . . . send your name and address to me on the coupon below. I'll send the free sample lesson—plus our 48-page book outlining today's career opportunities and how you can qualify for them. A coupon like this has started many thousands toward greater success. It can do the same for you. Mail it today!

GOOD-PAY JOBS IN 5 BIG FIELDS

If you were an expert accountant right now, chances are you would find yourself among the highest-paid of all professional men and women. Surveys show that accountants earn more than those in other major professions.

There are five big fields of opportunity open to Accountancy-trained men and women . . . opportunities that are wide open and highly inviting, offering maximum income and job security in good times or bad. And under LaSalle's "Problem Method" you can start earning while still learning—either in spare-time or full-time employment . . . or in business for yourself with no capital required.

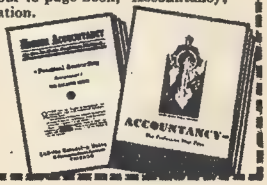
Get the latest information by sending for our 48-page book, "Accountancy, the Profession That Pays". . . plus free sample lesson. The coupon at right will bring both to you without cost or obligation. LaSalle Extension, 417 S. Dearborn St., Chicago 5, Ill.

Clip Coupon . . . Mail TODAY!

LaSalle Extension University . . . *A Correspondence Institution*
Dept. 1493H, 417 S. Dearborn Street, Chicago 5, Illinois

YES, MR. DOAK, I want to see how LaSalle's "Problem Method" works . . . how I can qualify for high-pay Accountancy positions. Also, send your 48-page book, "Accountancy, the Profession That Pays". . . all without cost or obligation.

Name.............................*Age*........
Street Address.................................
City, Zone & State..............................
Present Position................................



INVENTIONS WANTED

BY THESE 138 WEALTHY COMPANIES

DON'T SELL YOUR PRECIOUS IDEAS CHEAP! Brand-new, impartial and unbiased book—"**Inventors Sales Bulletin**"—now lists 138 reputable manufacturers who want to see your ideas—patented or unpatented—and are ready to put acceptable ones into production **and pay cash or royalty!** This book gives company names, addresses, persons to contact, exactly what they are looking for, etc. ALL FIELDS COVERED. How to avoid expensive mistakes others have made; how to choose a broker to sell your invention for small commission; how to sell patents through advertising at small cost; how much to ask for your invention; what to do about releases, working models. Also gives complete, illustrated plans for a new kind of sales portfolio that helps sell your invention faster, for more money; and a copyrighted disclosure form that makes it easy for you to contact manufacturers (requires no letter writing). Many illustrations, diagrams.

SEND NO MONEY: This new book was prepared at considerable cost by editors of Science and Mechanics Magazine TO PROTECT NEW INVENTORS. Examine it for a week—**without risking a penny.** Just send us your name and address. Book will be shipped at once. Pay postman only $2.00, plus 45c Delivery Charges. If not convinced book can be worth hundreds or even **thousands** of dollars to you—return it for a **Complete** Refund. Or send only $2.00 NOW and WE'LL pay postage. Same refund privilege after week's examination. INVENTIONS ARE WANTED NOW! SO WRITE TODAY: **Science and Mechanics Magazine, Dept. 702, 450 East Ohio Street, Chicago 11, Ill.**

PATENTS **PATENT LAWYER**

GUSTAVE MILLER

ASSOCIATE EXAMINER
U.S. PATENT OFFICE 1922-1929

REGISTERED
PATENT ATTORNEY

Patent Attorney and Advisor
U. S. NAVY DEPT. 1930-1947

11MI WARNER BLDG.
WASHINGTON 4, D. C.

Send for
PATENT INFORMATION Book
and "INVENTOR'S RECORD"
without obligation

TAKE HIGH SCHOOL AT HOME

YOU NEED A DIPLOMA

...to get a better job or more rapid promotions! C.T.I. guided study method helps you earn yours *in months*. Equals resident work. Saves time. *Texts supplied*. College prep. Credit for work elsewhere. Easy terms. *Write for valuable free booklet today!*

COMMERCIAL TRADES INSTITUTE

1400 Greenleaf Ave. Dept. H3-1 Chicago 26

[*Continued from page* 24]

for lighting. You cannot strike this match anywhere except on the specially prepared striker. You blow it out when you are through using it and put it back in your pocket. There's no ash or blackened tip to rub off and the flame it gives is about the same size as that of a match but is not blown out as easily. Supposedly it would cost no more to manufacture than a similar number of matches.

This article is not yet on the market—but I have seen it in operation. So maybe the ultimate answer will result from a revaluation of chemical methods. The pocket lighters are taking a turn for the better and soon it may be possible to use pellets, rods or compressed gases to furnish the fuel at prices comparable to or lower than the cost of production and handling of book matches.

Next Month

Next month Mr. Kraus will analyze another invention for which a need often has been expressed—the self or easy opening envelope.

INVENTIONS WANTED

Cash-in on our connections with prominent manufacturers and national distributors who come to us for new products. We assist you with your invention from idea stage through to developed product. *Full Protection* for you.

Write for Booklet "M."

ELO DEVELOPMENT CO.
CHATHAM-PHENIX BLDG.
LONG ISLAND CITY, 1, N. Y.

INVENTORS

If you have a PATENTED or PATENT PENDING Invention TO SELL or LEASE

Request our FREE book

(No Obligation)

U.S. PATENT EXCHANGE

406 SOUTH SPRING STREET (Suite L) LOS ANGELES 13, CALIF.

NOW READY! A Sensational New Line Of

1951 MIDWEST TELEVISION

CONSOLES and COMPLETE CHASSIS

Featuring the NEW MAMMOTH

19½-Inch BLACK PICTURE TUBE

At Low Factory Prices

EASY TERMS

Never before have you seen such tremendously BIG clear pictures, such luxurious cabinets, such sensationally low Factory Prices as Midwest offers in its 31st Anniversary Line of 19½" and 16½" TV Consoles, TV-Radio-Phono Combinations, and complete TV Chassis.

"VIDEO GRAND" 19½" Television-Radio-Phonograph Console

Check these features: Mammoth 19½-Inch Picture Tube (225 sq. in. image); Synchronized sound and picture; Simplified One-Knob Tuning; Big 12" Panasonic Speaker; Video-Sonic Tuner; and scores of other features.

MIDWEST 19½" Television Chassis and Speaker

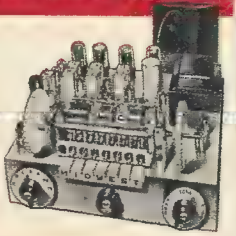
LET US PUT THIS Luxurious NEW 1951 19½-Inch TELEVISION "CONSTELLATION" CONSOLE In Your Own Home On 30 DAYS MONEY BACK TRIAL

You Must Be Satisfied or Your MONEY BACK

Plus Powerful New 1951 World-Ranging 5-Band MIDWEST [illegible] 16 RADIOS In Beautiful Consoles and Complete Chassis

An entirely new line featuring the powerful Series 16 AM-FM Five-Band Radio Chassis and the magnificent Symphony Grand Radio-Phonograph with 3-Speed Automatic Intermix Record Player.

EASY TERMS



MIDWEST RADIO & TELEVISION CORP.
DEPT. 41-G, 909 BROADWAY, CINCINNATI 2, OHIO

SEND COUPON TODAY
For This NEW 1951 4-Color
FREE MIDWEST RADIO-TELEVISION CATALOG

WRITE IN NAME AND ADDRESS (PLEASE PRINT) ON COUPON OR 1c POSTCARD

MIDWEST RADIO & TELEVISION CORP.
Dept. 41-G, 909 BROADWAY • CINCINNATI 2, OHIO

Please send me your new FREE 1951 Catalog.

NAME ____________________

ADDRESS ____________________

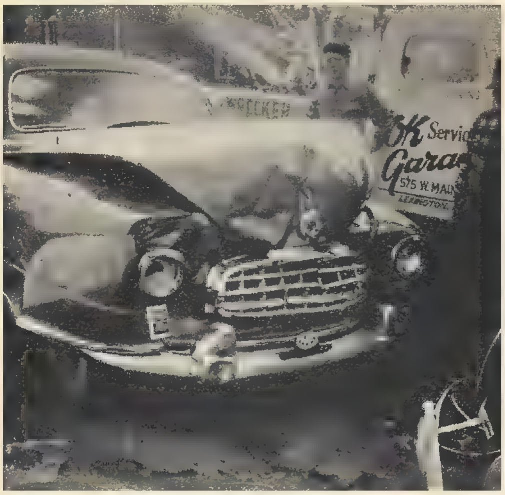
CITY ____________ ZONE ____ STATE ____________

Dear Editor—

[Continued from page 22]

Nash In A Crash

Mr. W. C. Zuern of Lexington, Ky., was driving his Nash across a railroad track and failed to notice a Diesel locomotive entering the crossing. The bumper of the Deisel caught the right side of the car pushing it sideways. Zuern gunned the engine, pulling away from the train. In doing so, he escaped the locomotive but rammed into a stone wall, hence the smashed up front end.



Zuern was not even bruised and in a car of rigid "X" frame design there's no doubt but that the damages would have been more severe. Police and witnesses as well as the owner expressed amazement at the comparatively mild results.

W. G. Haworth
Associate Director of Public Relations
Nash Motors
Kenosha, Wis.

Another Word Fiend

Perhaps you will be interested to know that I have extracted exactly 1000 words from your name Mechanix Illustrated. Will submit list on request.

C. W. Hall
Greenville, Mich.

No comment.

[Continued on page 30]

PLASTICAST

THE GREATEST THING IN PLASTICS!

A NEW HOME INDUSTRY AND HOBBY!

We have started **THOUSANDS** of people in a wonderful new kind of business! Here are 4 reasons why: (1) The work is pleasant and very easy . . . *actually as easy as pouring water out of a glass!* (2) **VERY LITTLE** investment is required; imagine, less than $5.00 is required in order to start you off in your own manufacturing business! (3) Can be started **ANYWHERE** . . . at home, garage, basement, etc. and most important (4) The things you can make in **QUANTITY PRODUCTION** are not only exceptionally attractive and useful but are always in big demand *every season of the year!* **VAST QUANTITIES OF PLASTIC COMPONENTS NOW NEEDED BY ARMED SERVICES!**

YOU CAN MAKE ANYTHING!

What is this new business? It is **CASTING** . . . Casting with liquid plastics. **CASTING** is a method of production manufacturing **WITHOUT MACHINERY OR TOOLS! CASTING** is the exceedingly simple process of pouring liquids into molds . . . it is as simple as that! Like making Jello, only these liquid plastics SOLIDIFY in a few minutes after mixing into extremely HARD, DURABLE and ATTRACTIVE articles such as Jewelry, Novelties, Giftware, Figurines, Statuary, Knick-knacks, Baby Shoes, Souvenirs, Ceramics, Imitation Marble, Bookends, Lamps, Pen sets, Cigarette Lighters, Toys, Dolls, Banks, Fishing Lures, Tools . . . **A THOUSAND USEFUL THINGS!** The field is really unlimited. We supply EVERYTHING . . . Casting Materials, Molds, Accessories and Instructions.

1000 GOLDEN OPPORTUNITIES

Regardless what you are doing now you can get into the CASTING BUSINESS in your spare time or evenings. We assure you, once you do, you will be eagerly devoting all of your time to this very easy, fascinating and **HIGHLY PROFITABLE OCCUPATION** until it leads into a dependable business all your own! **BUT LET US PROVE IT.** Send only 25c for our big 40 page Catalog of Casting Materials, hundreds of Molds, etc. We will also send you **FREE** an attractive **CASTING** to show you what can be done with liquid plastics in a few minutes! We will also send you FREE a valuable book giving you details on the **ART AND BUSINESS OF CASTING** which shows you how to cast and get started! All this for only 25c, but write for it today. *This may be the lucky coin that will start the most fascinating and profitable phase of your life!*

COMPLETE OUTFIT—Only $3.50

If you want to get started at once send for our big **SENIOR PLASTICAST OUTFIT** consisting of **TEN VALUABLE METAL MOLDS** for making extremely beautiful and useful TRANSPARENT crystal-clear or colorful plastic articles of real value! Make unusual Penholders, Cigarette Lighters, Ashtrays, Pendant Hearts, Souvenirs. Imbed Flowers and Photos, Brooches, Key-Chain Fobs, Paperweights and countless attractive items! Pipette, Measure, Imbedding and Polishing Materials, 2 dyes, Instructions and quart of **PLASTICAST** and hardener for making about $100. worth of castings! **COMPLETE OUTFIT**, ppd. **$7.50 SMALLER OUTFIT**, 4 molds, pt. **PLASTICAST**, accessories, ppd. **$3.50**

FREE

THE ART AND BUSINESS OF CASTING

PLASTICAST CO. (Dept. H)
170 N. Halsted St. Chicago 6, Ill.
(Write to nearest address)
P. O. Box 987 Palo Alto, Calif.

LEARN AT HOME TO MOUNT BIRDS

Animals, Heads, Fishes, Pets; to TAN.
Be a Taxidermist. Profit and FUN.

Hunters, save your valuable **TROPHIES.** Mount ducks, squirrels, everything. Learn to **TAN** for leather and furs. Wonderful **HOBBY** Have a **HOME MUSEUM. BIG PROFITS** mounting for others. **INVESTIGATE NOW.**

FREE BOOK With 100 fine game pictures. **NOW** absolutely **FREE. Write TODAY.**

Send Postal TODAY for FREE BOOK. State AGE.
N.W. SCHOOL OF TAXIDERMY, Dept. 2401. Omaha, Neb.

"We have been using your book on Auto Repair for the past year and feel like it is a third man around the shop."—*F. M. Scott, Stanwood, Wash.*

"Fixed motor in 30 minutes another mechanic had worked on half a day."—*C. Auberry, Murfreesboro, Tenn.*

"Instructions so clear, have no trouble learning anything about any car. Now working as mechanic in big plant."—*S. Ordonez, San Francisco, Calif.*

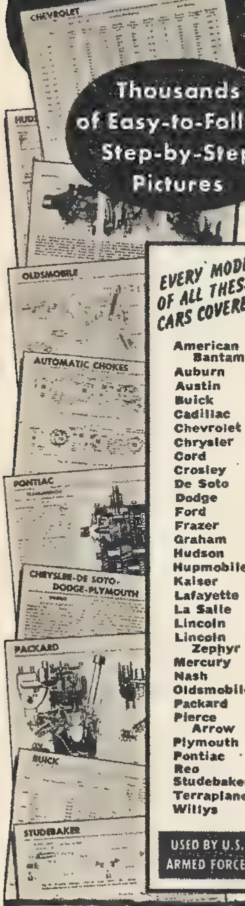
"So easy to understand —have done jobs with Manual I would not have attempted without it." —*C. L. Vanerstrom, Hazel Park, Mich.*

"I have found my MoToR Manual a wonderful help. It has put me in a position to do every job." — *S. L. Sharpless, Los Angeles, Cal.*

THOUSANDS OF MEN ARE RAVING ABOUT THIS GIANT GUIDE!

Now YOU Can Be a "*Cracker-jack*" at Auto Repairs!

BRAND-NEW 1950 EDITION!



Thousands of Easy-to-Follow Step-by-Step Pictures

EVERY MODEL OF ALL THESE CARS COVERED:

- American Bantam
- Auburn
- Austin
- Buick
- Cadillac
- Chevrolet
- Chrysler
- Cord
- Crosley
- De Soto
- Dodge
- Ford
- Frazer
- Graham
- Hudson
- Hupmobile
- Kaiser
- Lafayette
- La Salle
- Lincoln
- Lincoln Zephyr
- Mercury
- Nash
- Oldsmobile
- Packard
- Pierce Arrow
- Plymouth
- Pontiac
- Reo
- Studebaker
- Terraplane
- Willys

USED BY U.S. ARMED FORCES

Easy-Step-by-Step Instructions Show How to do ANY Job on ANY Car—from 1935 through 1950!

THOUSANDS of men are raving about MoToR's BIG NEW ILLUSTRATED AUTO REPAIR MANUAL! It enables them to do *any* job FASTER and better; do MORE jobs; make MORE money!

Whether it's on a 16-year-old "jaloppy" or a brand-new '50 beauty, YOU, too, can "breeze through" *any* repair job quickly, easily, right! Just look up the make, model, and job in the quick index—and *go to it!*

Everything You Need to Know to Repair Any Car!

This NEW, REVISED, edition has MORE REPAIR INFORMATION THAN EVER—right up to the minute! 740 big pages, 2180 "This-Is-How" pictures — clear drawings, diagrams, cut-away photos that lead you every step of the way. Over 200 "Quick-Check" charts containing more than 35,000 essential repair specifications. Over 200,000 service and repair facts. Clear, simple directions. You *can't* go wrong!

Any man—even a green beginner—can do a good job. If you're a top-notch mechanic, you'll find yourself tackling jobs now that you wouldn't touch before!

Earn More Money! Win Greater Prestige!

The editors of MoToR's Manual have put together all the "Know-How" from over 150 *Official Factory Shop Manuals;* "boiled it down" into one handy book!

Includes Automatic Transmissions and Semi-Automatic Transmissions. Covers the new GM Rochester Carburetor, Engines . . . Chokes . . . Carburetors . . . Fuel Pumps . . . Hydramatic Drives . . . Overdrives . . . Oil Filters . . . Starting Motors . . . Generators . . . Distributors . . . Clutches . . . Universals . . . Axles . . . Brakes . . . Steering Gears . . . Shock Absorbers, etc.

Valuable help in Body Service. Factory Specifications and Adjustment Tables. Tune-up Charts. Tables of Measurements and Clearances. Overhauling and Replacement Facts — AND MUCH, MUCH MORE.

Used by Armed Forces, hundreds of thousands of auto service men! YOU'LL want it, too, once you see its 740 giant pages—almost a foot high!—its 2180 close-up pictures! Try it on the following UNCONDITIONAL GUARANTEE:

Try Book for a Week FREE

Send No Money. Pay nothing to postman. Test book in your own garage or shop. *It's GUARANTEED to pay for itself in 7 days.* If it doesn't, just return the book, and owe nothing. You don't risk a penny. Rush coupon for your free-trial copy of this great money-saving Manual. MoToR Book Dept., Desk 31, 250 West 55th St., New York 19, N. Y.

MOTOR'S
AUTO
REPAIR
MANUAL

SEND NO MONEY! TRY BOOK FOR A WEEK FREE!

Same FREE 7-Day Offer on MoToR's NEW TRUCK and TRACTOR REPAIR MANUAL

MoToR's
TRUCK & TRACTOR
REPAIR MANUAL

BRAND-NEW! Covers EVERY job on EVERY gasoline-powered truck and farm tractor made from 1936 thru 1949! 1867 pictures, 968 big 8½ x 11-inch pages, 300,000 facts. Used by Armed Forces. All types Gasoline Engines, Fuel Systems, Governors Lubrication Systems, Ignition Systems, Starters, Generators, Clutches, Transmissions, Axles, Torque Dividers, Transfer Cases, Brakes, Steering, etc. Check proper box in coupon for free trial.

MAIL COUPON NOW FOR 7-DAY FREE TRIAL

MoToR Book Dept., Desk 31,
250 West 55th Street, New York 19, N. Y.

Rush to me at once: (Check box opposite book you want)

☐ **MoToR's New AUTO REPAIR MANUAL.** If O.K. I will remit $1 in 7 days (plus 35c delivery charge), then $2 monthly for 2 months, and a final payment of 95c a month later. Otherwise I will return book postpaid in 7 days. *(Foreign price, remit $8 cash with order.)*

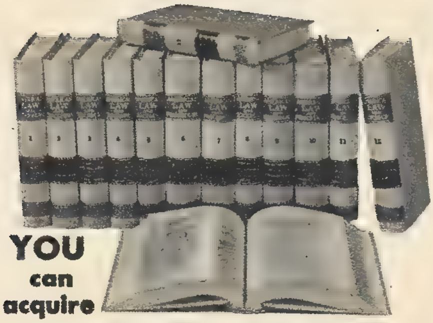
☐ **MoToR's New TRUCK AND TRACTOR REPAIR MANUAL.** (Described at left.) If O.K. I will remit $2 in 7 days, and $2 monthly for 3 months, plus 35c delivery charge with final payment. Otherwise I will return book promptly. *(Foreign price, remit $10 cash with order.)*

Print Name ....Age ....

Print Address ....

City & Zone No.......................................State..........

☐ **SAVE 35c** delivery charges by enclosing WITH COUPON check or money order for full payment of $5.95 for Auto Repair Manual (or $8.00 for Truck and Tractor Manual). Same 7-day return-for-refund privilege applies.



YOU can acquire LAW NIGHTS AT HOME! L L.B. DEGREE

LaSalle's famous Law Library—used as reference in many Law libraries and Law offices—has enabled thousands to master Law surprisingly fast, in spare hours at home, for business and professional advancement.

These 14 remarkable volumes, compiled by leading professors and lawyers, cover the whole basic field of Law in condensed, orderly, simplified manner.

You advance rapidly with this great library, plus special lectures furnished. We guide you step-by-step with personalized Problem Method of instruction . . . you *learn by doing*—handling legal problems—not by memorizing rules.

Send for two FREE 48-page booklets, "Law Training for Leadership," and "Evidence," answering questions about Law and its value to you, and telling how LaSalle Law graduates are winning rapid advancement in business and public life. Mail coupon below. No obligation.

LA SALLE EXTENSION UNIVERSITY
A Correspondence Institution
417 S. Dearborn St. Dept. 1493L Chicago 5, ILL.

Send me your two FREE booklets described above, without obligation.

*Name*__________________ *Age*______

*Street*________________________

*City, Zone & State*________________

LET ME PROVE I Can Make YOU a New Man!

I'VE done it for thousands of other fellows. Let me *prove* I can add solid inches of handsome, rippling muscles to YOUR arms, legs, shoulders, back . . . make *you* an outstanding specimen of strength and self-confidence. My secret of *"Dynamic Tension"* does it in just 15 minutes a day. You'll be amazed at the results and so will your friends.

Charles Atlas—winner of title "World's Most Perfectly Developed Man"

SEND FOR MY FREE BOOK

48 pages packed with valuable advice, actual photographs of fellows who became new men almost overnight . . . with *"Dynamic Tension."* Book can mean turning point of your life. It's yours—ABSOLUTELY FREE! Send for it TODAY. Address me personally: CHARLES ATLAS, Dept. 6A, 115 East 23rd St., N. Y.

5 INCHES OF NEW MUSCLE
"My arms increased 1½"; chest 2½"; forearm ⅞"."
C. S., W. Va.
"Have put 3½" on chest (normal) and 2½" (expanded)."
F. S., N. Y.

Dear Editor—

[*Continued from page 28*]

MI Monthly Mystery

An ad in the back of the program for the Canadian National Exposition in Toronto lists General Motors automotive products as Chevrolet, Pontiac, Oldsmobile, Buick, Cadillac and Vauxhall. What is this mysterious sixth?

John J. Boland
Oil City, Pa.

Tibet Gold Rush

Nice timing on your story on Tibet in the November MI (Tibet—Golden Roof Of The World, page 74). I picked up my copy of the magazine while the invasion was still going on and was surprised to read the following in the story: "The gold rush hasn't started yet—unless you count the Chinese Communist invasion."

I wonder if that could be the real reason for the invasion?

I. K. Janir
Chicago, Ill.

[*Continued on page 33*]

Here's how to make sure you *never* miss a copy of MECHANIX ILLUSTRATED, the science, crafts and hobbies magazine that has *everything:*

☐ One year: $1.80
☐ Two years: $3.50
☐ New Order ☐ Re-order
In Canada & Pan-America . . 1 yr. $2.40
Other Foreign Countries . . 1 yr. $3.15

Please enter my subscription to MECHANIX ILLUSTRATED

NAME________ ADDRESS________

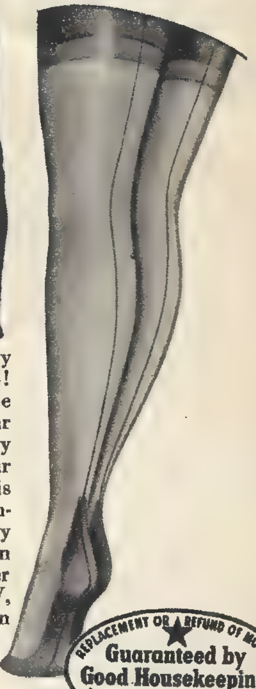
CITY______ ZONE____ STATE______

Mail to: MECHANIX ILLUSTRATED, Circulation Dept., Fawcett Building, Greenwich, Conn.

Earn Big Money WRITING ORDERS

AMAZING NYLONS

Guaranteed Against RUNS AND SNAGS *Regardless of Cause!*



REPLACEMENT OR ★ REFUND OF MONEY
Guaranteed by Good Housekeeping
IF NOT AS ADVERTISED THEREIN

The world's ONLY complete, nationally advertised nylon hosiery line actually guaranteed against runs, snags or excessive wear, REGARDLESS OF CAUSE! It's amazing, but true! No matter what the cause—hard use or deliberate abuse—Kendex nylons are replaced FREE if they run, snag or become unfit for wear within entire guarantee period! Every weight from sheerest 15 denier to heavy 70 denier—all gauges up to luxury 60 gauge—all sizes, lengths, popular shades, fancy heels, black seams—full fashioned and seamless. Nothing is missing to make sure every woman is pleased. In spite of the amazing guarantee, retail postage prepaid prices are no higher than comparable quality national brands. Should free replacement be necessary, actual cost is cut in half! How could any woman possibly resist saving money and solving her hosiery problems? NOT SOLD IN STORES. Men and women wanted NOW, spare or full time, to write orders and earn big money. You can get orders even if you never sold a thing in your life!

MEN'S HOSE GUARANTEED 1 YEAR

Kendex gives you FOUR complete lines, including sensational men's hosiery line actually guaranteed for ONE YEAR! Any pair not giving satisfactory wear within 12 months is replaced FREE without question. All styles, patterns, colors, yarns (including nylon) at lowest prices that mean steady income for you 52 weeks a year.

LINGERIE HOUSECOATS—ROBES

Full line of lingerie, housecoats and robes. Materials used include nylon crepe, nylon runproof tricot, multifilament rayon crepe, rayon tricot, rayon satin, etc. Nothing is lacking. Every garment at prices that defy competition and make women eager to order. Kendex values sell themselves.

NATIONALLY ADVERTISED

Kendex has advertised in Life, Look, Collier's, McCall's, Saturday Evening Post, Ladies' Home Journal, Good Housekeeping, etc. Carries the Good Housekeeping Guarantee Seal. Thousands of orders shipped daily. Yearly volume in millions. A dependable responsible national organization.

FREE SAMPLE MATERIALS AND MONEY-MAKING OUTFITS

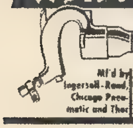
Man or woman—young or old, YOU can easily earn steady income, spare or full time. No money or experience needed. We supply EVERYTHING free and set you up in business at OUR expense. Nothing to buy or deliver. Write orders. We deliver and collect. Big advance pay plus huge cash bonus that increases your earnings up to 40%! Your name and address on postcard will bring you sample materials—samples of lingerie, hose, robe materials; self-selling sales books with FULL COLOR illustrations; 36-page sales manual showing you easy steps to success; color cards, free "door openers" worth $1 each but which you give away free; special plan to have others sell for you, etc., etc. You can start making money the minute you receive the complete FREE outfits.

YOUR COST ONE CENT!

SEND NO MONEY. Pay nothing now or later. No obligation. Not even a promise to return outfits. Simply write your name and address on a penny postcard and mail to us. We'll immediately rush you everything you need FREE and postage prepaid. WRITE TODAY!

KENDEX CORPORATION • BABYLON 587, N. Y.

WAR SURPLUS AND OTHER BARGAINS



Mf'd by Ingersoll-Rand, Chicago Pneumatic and Thor

PNEUMATIC RIVETER & CHIPPING HAMMER

Pistol grip. Ideal for fender, brake lining, concrete breaking work. Weight 5 lbs. Like new. Price each...
2X — $6.95 3X — $7.50 4X — $8.50

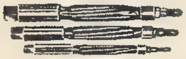
INSIDE MICROMETER 2" to 8"

Precision made of tool steel. Hardened tips on all six measuring rods. One ½" spacer. Chrome finish. Complete with case. **$6.95**

MICROMETERS

Chrome plated, precision engineered and carefully tooled to give long life. All new. 0-1" capacity . . . . ea. **$2.25.** 1-2" cap. **$3.50.** 2-3" cap. **$5.50.** 3-4" cap. **$6.50.**

EXPANSION REAMERS



Spiral Flute. Mfd. by Alvora Polk Tool Co. **All New,** original pack. 1/4"-3/8"-7/16" Recommended expansion limit, .006". Original value $12. Set of 3 . . . . **$4.95**

DRILL GRINDER

All New. **$2.80** each.

. . . Sharpens round, square or tapered drills up to 6" long. Even an amateur mechanic can get a new, factory finish on a drill in 25 seconds. New protractor feature gives every drill sharpening angle, with 5 convenient angles already marked off. Usable with hand or power stone. A brand new development, manufactured by Ten Eyck. Shipped postpaid

HIGH SPEED DRILLS

All New. Fractional & numbered. Orig. Val. $15. Nationally known brand. Astd. sizes. Set 30, **$3.50**

EXTENSION DRILLS

High Speed Steel, like new. Asst'd sizes from No. ¼ to 40. Lengths from 6" to 12". Approximately $20 value.
Set of 12 . . . . **$3.75**

ELECTRIC BELLS — Vibrating type, high pitch. 115 V., 60 Cycle. Ideal for use indoors or outdoors — on ranches, for schools, plant installations, as signal systems, burglar alarm systems, etc. Nationally known Mfr. ALL NEW in orig. Pkgs. Solid brass clapper & 8½" gong. Wt. 8 lbs. Govt. cost about $67.50 **Close out at . . . $7.95**

Send check, money order or cash. 25% deposit required on C.O.D. orders. All prices F.O.B. Culver City, California, unless otherwise stated.
Send 25¢ for Illustrated Catalog.

AIRBORNE SALES CO., INC. DEPT. MI 1-51 CULVER CITY, CALIF

No Experience Needed To

PRINT YOUR OWN POST CARDS

The GEM STENCIL DUPLICATOR saves money . . . gets results quickly! Hundreds of uses for every type of business and organization. We ship the GEM complete with all supplies, Guide Board for accurate printing and 60-page Book of Ideas at the special low price of only **$8.50** (a $15 value)

FREE TRIAL OFFER

Our 21st Year

Use the GEM **FREE** at our expense! SEND NO MONEY. Write and complete GEM outfit will be sent you postpaid. After ten days, send us only **$8.50** or return the GEM. You must be satisfied!

BOND EQUIPMENT CO. Dept. 41
6633 Enright • St. Louis 5, Mo.

FOAM RUBBER

FOR HOBBYISTS, CRAFTSMEN, EXPERIMENTERS

Lowest Prices—Save 50%		Auto Seat Topper Pads	
		Place under seat cover.	
16 x 16 x 1½" ......ea.	$1.35	24 x 60 x 1½" ......ea.	$5.95
16 x 22 x 1½" ......ea.	1.75	24 x 60 x 2" ....ea.	7.95
18 x 24 x 1½" ......ea.	2.00	12 x 14 x 1½" ......ea.	1.25
24 x 24 x 1½" ......ea.	2.75		

Use for furniture cushion fillers, mattresses, mattress pads, cushions. Foam Rubber is available in any size or thickness. Send for Free Price List. Immediate delivery. No C.O.D.'s. Add 10% for postage & handling to above prices. Please print.

RIOR RUBBER COMPANY, Dept. A-11
50 E. Cermak Road Chicago 16, Ill.

LAW FREE BOOK

THE LAW TRAINED MAN

Your **FREE** copy of "The Law-Trained Man" shows how to gain prestige and greater earnings through Blackstone home law study. All instruction material furnished including 18-volume Law Library written by 65 well-known law authorities. Lawyers, judges among our graduates. LL.B. degree. Low cost; easy terms. Write today.

BLACKSTONE COLLEGE OF LAW 225 N. Michigan Ave. Dept. 61, Chicago 1, Ill.
A Correspondence Institution Founded in 1890

ARTISTS MAKE MONEY

DO YOU LIKE TO DRAW?

Send name, address, age and occupation for FREE ART TEST, to find out your ability.

ART INSTRUCTION, INC.
1061 Art Instruction Bldg., Minneapolis 15, Minn.

"How to Make Money with Simple Cartoons"

A book everyone who likes to draw should have. It is free; no obligation. Simply address

FREE BOOK

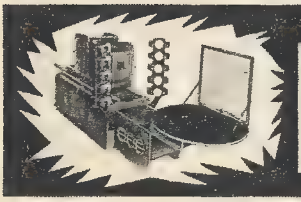
CARTOONISTS' EXCHANGE
Dept. 351-D Pleasant Hill, Ohio

ITALIAN ACCORDIONS

All types, all models, Very best. Hand Made. Fully guaranteed. Buy direct from Factory representative at lowest wholesale prices and Save Money. Also Button Accordions, Chromatic Accordions and Concertinas. We take any instruments in trade. Send name and Address for FREE catalog.

ITALIAN ACCORDION MFG. CO.
7600 Cottage Grove Ave., Dept. MI-1, Chicago 19, Ill.

BE A PHOTO-ENGRAVER



We furnish complete equipment and supplies. Learn at home or in our modern, friendly APPROVED school in MISSOURI. Get into this big demand, high profit, high wage field. You can start your own profitable, full time or part time PHOTO-ENGRAVING business right in your own home. Be independent, be your own boss or pave the way to a high pay job with experience gained in your own shop.

TASOPE TRAINING and TASOPE EQUIPMENT has enjoyed world wide recognition since 1931. Write for descriptive literature today. No obligation.

THE AURORA SCHOOL OF PHOTO-ENGRAVING, DEPT. MI 1, TASOPE BLDG., AURORA, MO.

Dear Editor—

[Continued from page 30]

● Two Sinks For One

In reference to Mrs. Robertson's question about her strangely glowing sink in the October Dear Editor column, I suggest that the glow is not in the sink at all. Rather it is in the human eye.

I went into our darkened kitchen one night and reached up to turn on the bright light above the white porcelain sink. The bulb lit and immediately burned out, plunging me back into darkness. In about two seconds a glowing image of the sink and surrounding objects came back into my perception. I placed a new bulb in the socket and investigated this effect for a while.

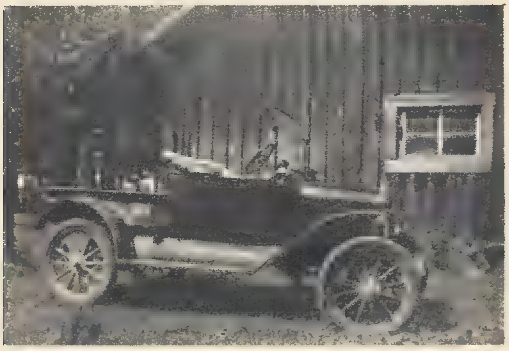
You can make the sink reappear on the other side of the room if you turn around quickly enough after switching the light on and off. It's lotsa fun—why don't you try it yourself?

W. B. McGill
Atlantic City, N. J.

No thanks, after drying the dinner dishes, one sink is enough for us.

● Oldtimers On The Road

Here's my 1915 Model T Ford. The kerosene lamps are used as parkers because there is no starter, generator or battery. The magneto keeps it running.



She'll cruise at 30 mph and 50 mph is not impossible on the level!

Gary Newell
Cavan, Ont.

On the level? Maybe down a steep incline.

FREE
ALLIED'S
NEW 1951
RADIO and
TV CATALOG
Allied Radio
SEND FOR THIS
212-PAGE BOOK
SAVE ON EVERYTHING
IN RADIO AND TV

Get Radio's Leading Buying Guide!

Save money on every purchase you make from the world's largest radio supply house! Send for ALLIED's new 212-page 1951 Catalog packed with *everything* in Radio and Television. Widest selections of home radios, TV equipment, phono-radios, Amateur equipment, P.A. systems, Hi-Fidelity music systems, recorders, test equipment, builders' kits—plus thousands of parts, tubes, tools, books and diagrams. Get more for your money—send today for your FREE 1951 ALLIED Catalog, the preferred Buying Guide to *everything* in Radio, TV and Electronics.

BUILDERS' KITS • TELEVISION
HI-FIDELITY CUSTOM SOUND
AMATEUR GEAR • THOUSANDS
OF PARTS TUBES, TOOLS,
TESTERS, BOOKS, DIAGRAMS

Everything for:
Servicemen
Engineers
Experimenters
Builders
Amateurs

ALLIED RADIO

FREE CATALOG

ALLIED RADIO CORP., Dept. 6-A-1
833 W. Jackson Blvd., Chicago 7, Ill.

☐ Rush FREE 212-Page ALLIED Catalog

Name....................................

Address.................................

City..................Zone....State..........

BE YOUR OWN BOSS-AND KEEP THE PROFITS

with amazing, beautiful new PEARL finish

Marvelous new finish can be applied permanently to any surface, giving a lovely, lustrous PEARL coating in beautiful colors to thousands of objects. YOU can start right in your own home WITHOUT ANY EXPERIENCE turning out these lovely PROFITABLE things and make a BIG INCOME—up to $5.00 per hour to start. The market for PEARL-KOTE finishes is TREMENDOUS—in the field of baby shoes covering alone there are 5 million new customers every year. Don't regulate your life to the other fellow's whim . . . BE YOUR OWN BOSS. Grasp this OPPORTUNITY of a lifetime TODAY. Get all the FREE details right now . . . SEND TODAY. Find out for yourself what PEARL-KOTE can do for you. SEND NO MONEY—simply fill out and mail the coupon at right to get all the FREE FACTS—BUT do it NOW!

FREE! COMPLETE "GO IN BUSINESS ON A SHOESTRING PLAN"

START RIGHT AWAY!—SPARE OR FULL TIME

PEARL-KOTE CO. DEPT. M-511 2111 W. MANCHESTER
LOS ANGELES 47, CALIF.

MAIL COUPON NOW!

PEARL-KOTE CO., Dept. M-511
2111 W. Manchester Ave., Los Angeles 47, Calif.
Okay! RUSH me FREE FACTS at once.

Name____________________

Address____________________

City ________ Zone ____ State ______

BRUSHES ONLY 4¢ EA.

SUITABLE for
- PAINT, ENAMEL
- LACQUER
- GLUE, PASTE
- OIL & CHEMICALS

ideal for WORKSHOP use, HOUSEHOLD, FACTORY and HOBBYISTS

100 Assorted Brushes	$4.00
50 Assorted Brushes	3.00
25 Assorted Brushes	2.00

MINIMUM ORDER $2.00
Postpaid. No C.O.D.

G. ELGENE MFG. CO.
Box 147, Ft. Hamilton Sta.,
Brooklyn 9, N. Y.

MACHINE SHOP MEN Needed Now!

TODAY shop men are in big demand. Don't miss the chance to get into the big money class and to qualify for promotions to high pay positions. Opportunities are open to men who add to their "know how" day by day. Equip yourself without delay.

8 BIG BOOKS ON APPROVAL

Modern Shop Practice, 14th edition, is the 8-volume set for the use of ambitious men. It contains 4,000 pages of vital information—3848 illustrations—167 tables. Written simply and clearly by 41 experts in tool making, pattern making, foundry work, forging, mechanical drawing, blueprint reading and many other skills. With the set we include a special binder of 860 profusely illustrated pages covering machine shop operations step by step, and 293 actual job tickets. 9 books in all! See also our gift offer at the left.

DICTIONARY OF MACHINE SHOP TERMS
Pocket Size
included as gift if you act NOW, whether you keep or return the set.

Send the coupon NOW. Examine these books and note their great help to you. If you want to keep the set, pay on the very easy terms. If not, return the 9 books and owe us nothing. Remember—we now give a year's consulting privileges with our engineers without charge.

PUBLISHERS SINCE 1898

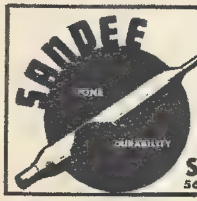
AMERICAN TECHNICAL SOCIETY, Dept. S1320
Drexel at 58th St., Chicago 37, Illinois

Send me the 8 big books and special binder on approval. I will pay delivery charges only. If I decide to keep the books I will send $3.00 in ten days and $4.00 per month until the total price of $34.80 is paid. If I return them in 10 days I can keep the dictionary and owe you nothing. You also agree to send me a certificate entitling me to consulting privileges without extra charge.

Name____________________

Address____________________

Please attach a letter stating age, occupation, employer's name and address and name and address of at least one business man as reference. Men in service, also please give home address.



SPORTONE MUFFLERS

Ford & Chevrolet	$ 4.45
All other popular cars	5.45
V-8 Dual Sets	15.95
Chromed Silentips	2.95

(Please state make & year of car on all order)

SANDEE MUFFLER CO.
5643 Corryne Place • Culver City, California

"YOU ARE UNDER ARREST!"

Help Bring Crooks to Justice Through Scientific CRIME DETECTION!

We have taught thousands this exciting, profitable, pleasant profession. Let us teach you **in your own home.** Learn Finger Printing, Firearms Indentification, Police Photography, Secret Service Methods thoroughly, quickly, at small cost. Over 800 of all American Bureaus of Identification employ I. A. S. students or graduates. We can prepare you for this fascinating work, during spare time. Write today, **stating age,** for "Blue Book of Crime."

INSTITUTE OF APPLIED SCIENCE, 1920 Sunnyside Ave., Dept. 2351, Chicago 40, Ill.

500 TRICKS
Douglas MAGICLAND

MAGIC TRICKS

IT'S FUN TO DO MAGIC

Be popular! Amaze—mystify—entertain! For 30 years Douglas has satisfied customers all over the world. Now, you can enjoy this fascinating hobby. Only 10c brings our new 1950-51 Catalog 500 Tricks, containing brand new tricks for pocket, parlor, stage. Join in the fun—send 10c today!

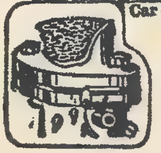
DOUGLAS MAGICLAND
Dept. M Dallas, Texas

FREE TEST LESSON

ANALYZE Handwriting —NEW AND FASCINATING FIELD!

Business and professional men and women—and home-makers—report part time earnings, satisfaction, personal development with grapho analysis. Home study. Test lesson, YEAR BOOK free. No children. I.G.A.S., Inc., Wilhoit Bldg., 502, Springfield, Mo.

CARBURETOR TOO RICH MAKES MOTORIST TOO POOR



Car owners who are wasting money and not getting proper gas mileage due to over-rich mixtures will be pleased to learn how to save gasoline by VACU-MATING over-rich mixtures. VACU-MATIC fits all cars, trucks and tractors. It is *automatic* and operates on the supercharge principle. Easily installed in a few minutes.

SALESMEN WANTED! Big Profits! Send name, address on penny postcard for *free particulars* and how to get yours for introducing.

VACU-MATIC CO., 7617-1692 W. State St., WAUWATOSA, WIS

BE AN ARTIST

Here's the Amazing Way You Learn to Draw — Step by Step — at Home in Spare Time

DRAW FOR MONEY

TWO BIG ART OUTFITS GIVEN

Upon enrolling, we send you the **first** of TWO complete Artists' Outfits, including all the material you need to start this fascinating training. Later in the course you receive the second, advanced outfit. All at no extra cost!

Read What These Graduates Say:

TRAINING PAYS OFF—Fred B. Chott of Cicero, Illinois, says, "I have turned your teaching into profit very quickly." (1-49)

STAFF ARTIST AND CARTOONIST—G. W. Thomas, Los Angeles newspaper artist, says, "WSA is Number One School in U. S. A." (1-48)

FREE BOOK GIVES DETAILS

"Art for Pleasure & Profit" tells about our course of instruction and commercial opportunities for you—also about WSA students, reproductions of their artwork, and results enjoyed by our graduates.

G. I. APPROVED **Est. 1914**

FOR VETERANS

WASHINGTON SCHOOL OF ART

Enjoy a pleasant, profitable Art career. COMMERCIAL ART, DESIGNING, CARTOONING—all in one complete, modern home study course. Trained Artists are capable of earning $65, $80, $100 and more a week. Good Art positions await you in this great field. Become your own boss—work at home on your own time. Many students earn extra money while learning by designing posters, doing simple artwork, lettering, etc. WSA is now in its 37th year of training successful men and women. No previous Art experience necessary. We teach you from the beginning. Qualify for professional Art jobs in advertising, television, newspaper and magazine publishing, department stores, printing, art studios, etc. Get the exciting facts now in free, illustrated book. Low cost, easy terms.

MAIL COUPON FOR FREE BOOK

WASHINGTON SCHOOL OF ART
Studio 201A, Washington 5, D. C.

Send me without obligation your Free Book, "Art for Pleasure & Profit", with full information. No salesmen will call. (Please print).

Name.. Age......

Address..

City........................Zone....State...........

I am entitled to training under G. I. Bill. ☐

Save time! Save money!

SEND FOR THIS BIG NEW

HUNT'S WOODWORKERS CATALOG NO. 17

NEW LOW PRICES

Greatest selection of fine domestic and imported woods—144 pages of real money-saving bargains

QUICK DELIVERY on maple, poplar, oak, mahogany, red cedar, cherry, walnut, and many others—all properly seasoned and kiln dried.

EVERY wood craftsman should have this big new catalog. Shows 32 rare and fancy woods in color... 43 veneer designs... multicolored bandings, inlays, overlays...275 scroll patterns...all kinds of tools, machinery, cabinet hardware, ornaments, mouldings...plus... pages of ideas, hints, instructions, and information for beginner and advanced craftsman. You'll save time and money with this catalog. Yours for only 15 cents — refundable on first order. Use the coupon — send for your copy NOW.

ONLY 15c

MAIL TODAY

CRAFTSMAN WOOD SERVICE CO.
2729 South Mary Street, Dept. G-1
Chicago 8, Illinois

Please send me your big, new Catalog No. 17. Enclosed is 15c—to be refunded on my first order.

NAME..

ADDRESS.......................................

CITY...........................ZONE......STATE..........

① I SHOW YOU HOW TO

MAKE MONEY AT ONCE

② START YOUR OWN BUSINESS IN 2 WEEKS— AT HOME IN SPARE TIME

METALIZE BABY SHOES

IF YOU ACT NOW, I will show you how to start earning extra money immediately—in spare or full time. **AND I SHOW YOU HOW** to start your own profitable business. With my complete course and easy-to-understand illustrated instructions containing trade secrets of ALL metalizing processes PLUS 2 beautifully processed sample metalized baby shoes AND all my tested and proved methods of operating a successful metalizing business, I show you how to start YOUR OWN profitable, fascinating business right in YOUR OWN HOME. Up to $5 per hour possible. Absolutely no experience needed. For PROOF send coupon today for FREE details of my MONEY MAKING PLAN for you and be convinced.

FREE! MONEY MAKING PLAN

Full Details Without Obligation

MAIL COUPON TODAY!

KIKTAVI CO.
Dept. M-511, 2111 W. Manchester, Los Angeles 44
Send me FREE details of your MONEY MAKING PLAN, without obligation.

NAME____________________

STREET____________________

CITY____________ZONE____STATE____________

AUTO BODY
AND FENDER
REPAIR

Men!

Reading This Message Could Be the Most Important 40 Seconds In Your Life

From every indication Auto Body and Fender Repair work will continue to be one of America's Big Income fields. Here at U.E.I. we're training men for it — a **proven** plan that combines spare-time, home study and actual shop practice. Men from coast to coast have successfully completed the U.E.I. course in Auto Body and Fender Repair — many earned money while learning — many now have their own shops. What about you? Isn't this the time for you to see what this big-pay field offers you? Do this: Mail the coupon below and we'll send you our big, descriptive book, "Opportunities.", It's Free — Mail the Coupon.

UTILITIES ENGINEERING INSTITUTE, Chicago 14, Illinois
Founded 1927

UTILITIES ENGINEERING INSTITUTE,
2523 Sheffield Ave., Dept. XJ-8, Chicago 14, Illinois

Please send, Free, Your Book "Opportunities".

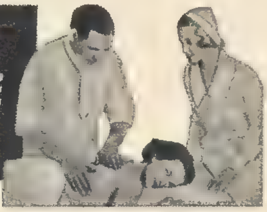
NAME (print) ....AGE.....

ADDRESS ....

CITY.................. (Zone).... STATE........

☐ Check here for information if you are under 17.

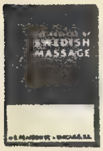
Prepare for PROFITABLE CAREER



in Spare Time at Home

HEALTH FIELD OPPORTUNITIES FOR MEN AND WOMEN, 18 TO 60

Many graduates between 18 and 60 make big money giving scientific Swedish Massage and Hydrotherapy treatments. There is big demand from doctors, hospitals, sanatoriums and clubs. Graduates earn large full time incomes from these or in private practice in their own offices. Others make good money from home treatments in spare time. Learn this interesting, money-making vocation through our easy-to-understand home study course. *Same instructors as in our nationally known resident school,* founded in 1906. You can win independence by qualifying in short time for graduation certificate.



32-Page Success Book FREE

This free booklet tells you what you want to know about this real opportunity to achieve success and security in the health field. Send the coupon now and learn what can be accomplished in scientific Swedish Massage. There's no obligation.

THE COLLEGE OF SWEDISH MASSAGE
Dept. 158A, 41 E. Pearson, Chicago 11, Illinois

Please send me FREE and postpaid, 32-page Success Book with information on Home Training.

Name________________________Age______

Address______________________________

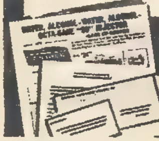
City____________________State________

BURN WATER

OR ALCOHOL OR BOTH IN YOUR CAR!

FOR ALL CARS, TRUCKS & TRACTORS

"...New high compression automobile engines which increase gasoline mileage up to 30% with alcohol-water gasoline fuels" says U. S. Dept. of Agriculture.



WRITE FOR FREE LITERATURE
Illustrated — Interesting — Descriptive
YOU'LL BE GLAD YOU DID

VANELL INCORPORATED
253 E. Angeleno
Dept. M-1, Burbank, Calif.

REAL ESTATE

BE A BROKER

PAYS BIG! SEND FOR FREE, BIG, ILLUSTRATED CATALOG NOW! No obligation. Graduates report making substantial incomes. Start and run **your own business quickly.** Men, women of all ages, learn easily. Course covers Sales, Property Management, Appraising, Loans, Mortgages, and related subjects. **STUDY AT HOME** or in our classrooms in big cities. Diploma awarded. G.I. approved. Nationally known.

FREE BOOK TELLS HOW

WEAVER SCHOOL OF REAL ESTATE (Est. 1936)
15 E. Pershing Road Dept. IM Kansas City, Mo.

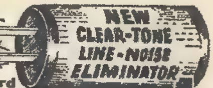
MASTER MIND!

Learn Short-Cut Mathematics

Juggle figures, do baffling number tricks. Make people gasp at your marvelous *lightning-quick* mind. Multiply 4 figures by 4 figures without using old-fashioned multiplication! Big cloth-bound volume; fully illustrated course. Includes worked-out problems, answers, etc. Sensational bargain, only $1.95, postpaid—or COD plus postage. Satisfaction guaranteed or refund. Order this amazing "Short-Cut Mathematics" today!

NELSON-HALL CO., 210 S. Clinton St. $1.95
Dept. 3A-3 Chicago 6, Ill. Complete

Reduce RADIO NOISES



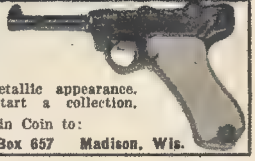
SIMPLY PLUG Radio or Appliance cord into Noise Eliminator and plug into wall socket. Enjoy reception FREE from many distracting noises. Send No Money, pay postman $1 each **(2 for $1.75)** plus postage or send cash and we'll mail postpaid. Try 5 days, money back if not delighted. Many hundreds of satisfied users. Send for yours today.

$1.00 EA
2 for $1.75

MERIT SALES, Dept. N-27
6560 SHERIDAN RD., CHICAGO 26, ILL.

AUTHENTIC GUN MODEL KITS

.45 Colt Automatic	$ 3.50
Luger	$ 3.00
Walther P-38	$ 3.00
Colt .44 Frontier	$ 3.50
Flintlock Pistol	$ 4.00
Sub-Machine Gun	$ 5.95



Easy to finish. Wood with metallic appearance. Order these models direct. Start a collection.

For Catalogue Send 10c in Coin to:

O'BRIEN GUNCRAFT P.O. Box 657 Madison, Wis.

MONEY for MEN ALL DATA FREE

THE PLASTEX Industry needs manufacturers on small scale and for big production of Lamp and Clock Stands, Art Goods and Novelties in Plastex and Marble imitation. Experience unnecessary. ½c material makes regular 10c store sellers. Rubber molds furnished for speed production. Small investment brings good returns. We are now placing big chain store orders with manufacturers. Ambitious men have chance for real prosperity. Our free booklet will interest and benefit you.

PLASTEX INDUSTRIES, DEPT. 3
3400 THIRD AVE., NEW YORK 56, N. Y.

IMAGINE THEIR JOY when they found they could play this easy-as-ABC way!

LEARNED QUICKLY AT HOME

"I didn't dream I could actually learn to play without a teacher. Now, when I play for people they hardly believe that I learned to play so well in so short a time."
*H.C.S., Calif.

PLAYS AT DANCES

"Your lessons have been most satisfactory. I can play all of the popular songs. I have earned money playing at dances."
*E.N.J., New York.

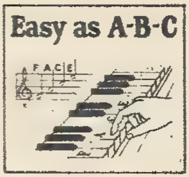
PLAYS ON RADIO

"I can't keep from telling you that I have a good position playing from KTHS, Hot Springs, Ark., every morning."
*J.S., Okla.

What Instrument Would You Like to Play?

JUST name your instrument and we'll show you how you can learn to play it—quickly, easily, in spare time at home. Never mind if you don't know one note of music from another—don't worry about "special talent." And forget all you've ever heard about music being hard to learn.

The truth of the matter is that *thousands now play who never thought they could!* Yes, men and women everywhere have discovered this amazingly easy way to learn music at home. Now they are enjoying the thrilling satisfaction of playing the piano, violin, guitar, saxophone or other favorite instruments. Some of them are playing in orchestras and over the radio; others are teaching music, making money in spare or full time. And thousands are having the time of their lives playing for their own enjoyment and the entertainment of their friends.



No tedious study and practice, no tiresome exercises. You learn to play *by playing*—start right in with the melody of a simple tune! It takes only a few minutes a day; the cost is trifling. Does it sound too good to be true? Mail the coupon and get the FREE PROOF!

SEND FOR FREE PROOF

Fascinating illustrated booklet answers all your questions; free Print and Picture Sample shows how method works. If interested, just mail coupon. U. S. School of Music, 971 Brunswick Bldg., New York 10, N. Y. 53rd Successful Year.

** Actual pupils' names on request. Pictures by professional models.*

FREE PRINT AND PICTURE SAMPLE

U. S. School of Music, 971 Brunswick Bldg., New York 10, N. Y.

Please send me Free Booklet and Print and Picture Sample. I would like to play instrument checked below.

Piano
Guitar
Hawaiian Guitar
Violin
Piano Accordion
Saxophone
Trumpet, Cornet
Pipe, Reed Organ
Tenor Banjo
Clarinet
Modern Elementary Harmony
Mandolin
Practical Finger Control

Name____________________ Have You Instrument?__________
Address ______________________________
City ____________________ State__________

Save 2c—Stick Coupon on Penny Postcard

Would YOU Like to Make $1,000 A MONTH?

That's what Stanley Hyman is making selling the amazing new PRESTO Fire Extinguisher!

Stanley Hyman

OVER 11,000 people died in fires last year. An eager public has been waiting for a practical *new* kind of fire extinguisher. Now it's *here!* Tiny "Presto" is about the size of a flashlight. Does the job of bulky extinguishers that cost 4 times as much and are 8 times as heavy. Ends fires fast as 2 seconds. Fits in palm of hand. Never corrodes. *Guaranteed for 20 years!* Sells for only $3.98!

You can make good money showing this new discovery to owners of homes, cars, boats, farms, etc., and to stores for re-sale. Stanley Hyman reports making over $1000 a month. H. J. Kerr, $20 a day. William Wydallis, $15.20 an hour.

What's the secret of "Presto's" amazing power? It's a new wonder chemical developed during the war, found to be 1.5 to 6 times as effective as chemical contents of other extinguishers on an equal-weight basis. Makes possible, for the *first time*, an extinguisher that is *small, light*, and *amazingly effective.*

Help supply the demand for this important new discovery. Write for FREE Sales Kit. No obligation; no capital required. But don't put it off. Every day you hesitate may cost you $10, $15, or even $50 you *could* be making. Send postcard or letter to: **MERLITE INDUSTRIES, Inc., Dept. 101, 201 East 16th Street, New York 3, N. Y.** *IN CANADA: Mopa, Inc., 371 Dowd St., Montreal 1, P.Q.* *(If you want a regular Presto to use as a demonstrator too, send $2.50. Money back if you wish. Returnable for FREE refills.)*

Science's New Midget Miracle "PRESTO"

NOW—INTENSIVE TELEVISION TRAINING AT HOME IN SPARE TIME

5 OUTSTANDING REASONS WHY C.T.I. TRAINING *IS* BETTER:

1. YOU BUILD A 12 OR 16-INCH TELEVISION SET—not a radio receiver. You keep this set.
2. YOU GET 20 BIG KITS—not just 8 or 10. You build your own testing instruments.
3. YOU TRAIN FOR TELEVISION—This is not a radio course with chapters added on video.
4. YOU GET SHOP-PROVED TRAINING—C. T. I. course based on teaching methods perfected in our own shops.
5. YOU GET INSTRUCTION MATERIAL FOR 5 YEARS—Your training is kept up to date for years, will not become obsolete with new television developments.

Compare with any other training! *Write for full information without delay.* Mail coupon today.

COMMERCIAL TRADES INSTITUTE

1400 Greenleaf, Dept. E3-1
Chicago 26

☐ Veteran ☐ Non-Veteran

☐ Television
☐ Electricity
☐ Refrigeration
☐ Auto Mechanics
☐ Diesel Mechanics
☐ Body-Fender Repair
☐ Drafting
☐ Building Constr.
☐ High School

Name____________________ Age_____
Address______________________________
City____________________ State__________

Learn A Trade NOW!
PRACTICAL SHOP TRAINING!

In Our Chicago Shops

☐ AUTO MECHANICS
☐ DIESEL MECHANICS
☐ REFRIGERATION
☐ BODY-FENDER
☐ WELDING—ARC and GAS
☐ MACHINIST
☐ PIANO TUNING

Above Approved For G.I.'s and Civilians
One of America's Leading Practical Schools
7 Floors of Fully Equipped Shops
Over 50,000 Successful Graduates
Expert Individual Instruction
Learn by Doing—Low Living Expense
Established 1902—Day and Evening Classes

Also the following Home Study Courses
☐ PLASTIC ☐ REFRIGERATION ☐ DIESEL

——CALL IN PERSON OR MAIL THIS AD TO——

GREER SHOP TRAINING
(Desk 11) 460 South State St., Chicago 5, Ill.

Please send without obligation free information regarding trade checked above. (Specify whether you are a Veteran ☐ or Civilian ☐)

Name.. Age......
Address ....
City...................................... State.............

The Plumber Protects The Health of the Nation

Don't Envy The PLUMBER·Be One

Make $15 to $50 a Day

Every skilled workman will tell you Plumbers have the best of it. WINTER and SUMMER the Plumber is busy at top wages. No skilled Plumber is ever out of a job. Compare his opportunities with any trade. To the man with know how, Plumbing means profit. Investigate Universal Plumbing School. Not a "war born School," but a plumbing school developed and operated by plumbers since 1923.

Own Your Own BUSINESS

Have your own business and big profits with little other than training and a kit of tools.

JOURNEYMAN Gets Good Salary

Master Plumbers own their own shop. A Journeyman works for a Master. With this training journeymen can depend on high wages.

BE A PLUMBER IN JUST 32 WEEKS

Learn With Tools—Not Books

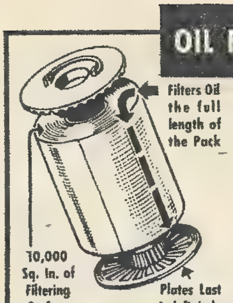
No need ever serve an apprenticeship. Don't envy the plumbers. big profits — enjoy them. Learn every trick of the trade—Leadwork — Blueprint for plan reading, etc. under Licensed Master Plumbers.

Over 7,000 Successful Plumbers Recommend This School

This system has made more than 7,000 plumbers. Investigate our past performance. If you like to work with tools this is your opportunity. Become a Plumber in America's largest and only school devoted exclusively to plumbing. Write today for FREE information.

G. I. Approved. Established 1923

UNIVERSAL PLUMBING SCHOOL
899 Holmes Street Kansas City, Mo.


Filters Oil the full length of the Pack
10,000 Sq. In. of Filtering Surface
Plates Last Indefinitely

OIL FILTER REFILLS . . . 10c

Here's News! Ordinary toilet paper makes an ideal oil filter. Laboratory tests prove it cleans oil faster and better than popular makes of filter elements. All you need is a simple set of **RETLIF ADAPTER PLATES** . . . and you can start using ordinary toilet paper rolls in your present oil filter. For proof and descriptive literature, send name and address to:

RETLIF CORPORATION, Dept. 64
1239 No. Highland Ave., Los Angeles 38, Calif.

TRAIN Your VOICE!

RESULTS GUARANTEED

STRENGTHEN *your* voice this tested, scientific way. Yes—you may now be able to improve the POWER of your speaking and singing voice . . . in the privacy of your own room! Self-training lessons, mostly silent. No music required. Write TODAY for Eugene Feuchtinger's great booklet "How to Develop a Successful Voice." It's absolutely FREE! You must state your age. Booklet mailed postpaid in plain wrapper. No salesman will call. Send your name and age RIGHT NOW!
Prefect Voice Institute, 210 S. Clinton St., Studio A-3, Chicago 6, Ill.

Learn Watch Repairing

This highly skilled, well paid trade offers unusual opportunities today. Watch repair men are in great demand for repairing watches and for working with the many new, delicate instruments of industry and re-armament. Study at G. I. approved resident school or by low-cost home study course in your own home. Thorough training. Catalog free. Write Dept. C-13 today.

AMERICAN INSTITUTE OF SPECIALIZED WATCH REPAIR
1010 Franklin Southeast Grand Rapids 7, Mich.

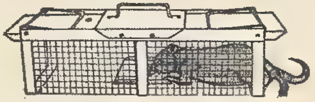
Learn Interesting Detail!

BOYS! MAKE YOUR OWN RADIO

Make your own simple, tubeless, batteryless Crystal Radio. SEND 25c for a GENUINE MELOMITE CRYSTAL with complete illustrated instructions for making your own set. Crystal sent postpaid with instructions and our own publication, "THE MAGIC CRYSTAL" which is full of news, diagrams, questions and answers of interest.

SEND 25c FOR YOUR CRYSTAL TODAY!

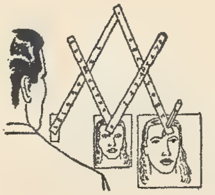
ALVA ALLEN RADIO Dept. 151 Clinton, Mo.



Catch Garden Pests, Rats, Varmints!

Protect grain, poultry with a *guaranteed* HAVAHART trap. Captures without injuring; can't hurt children or pets. No springs or jaws. Rustproof. Many sizes. Free booklet:

HAVAHART, 38-J Water St., Ossining, N. Y.



COPY ANY PICTURE
with the AMAZING PANTOGRAPH

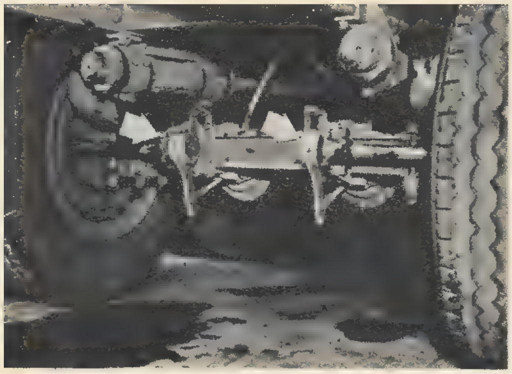
The ideal method of reproducing maps, pictures, diagrams, etc. Just place original design under the tracer point and simply trace it. Makes faithful accurate copies from 25% to 425% larger than original. Comes ready for use with extra pencil.

Sent Postpaid, anywhere in U.S. for only $1.00. Order today. No C.O.D.'s accepted.

DAVID W. WOLF P.O. Box 113-M, Lefferts Sta. Brooklyn 25, N. Y.

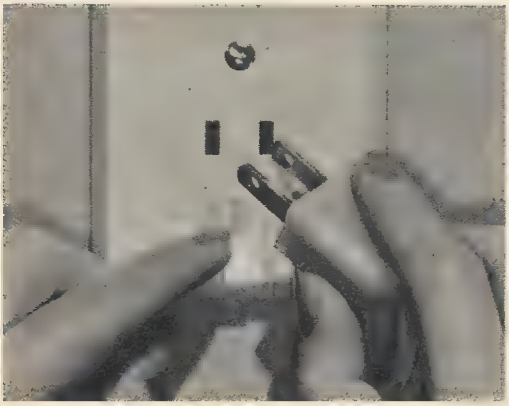
MIscellany

Brake Adjuster



Here is a device that automatically takes up slack in truck, trailer and bus brakes while the vehicle is in operation. As the lining wears, the Brakemaster advances the brake shoe to compensate for it. A dial on the gadget indicates the extent of brake lining wear. The arrows in the picture show the Brakemaster mounted on the splined camshaft of cam-actuated air brakes. One unit is required for each brake assembly. The Brakemaster Corp., 205 W. Wacker Drive, Chicago 6, Ill.

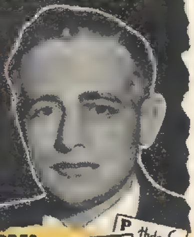
Safety Plate



You don't have to worry about prying fingers and resulting shocks and burns when you attach this "Shok-Pruf" shield over your electric outlets. When plug is removed the openings close automatically, open by a secret button when necessary. Hayman-Standard Products Co., Inc., 2024 Chancellor St., Philadelphia 3, Pa.

[*Continued on page* 41]

MY SENSATIONAL NEW
MAGIC-SCREEN
12 POINT INCOME PLAN
OFFERS YOU
BIG MONEY!
AT HOME
SPARE OR
FULL TIME



B. A. KNIGHT, PRES.

TOYS GLASS PLASTICS PAPER

REPRODUCE ANY PAINTING, DESIGN, TRADE-MARK, PRINTING, PICTURE, IN FULL COLOR ON ANY SURFACE!

Proven new method enables *YOU* to cash in on multi-million dollar *established* business. Closely guarded trade secrets formerly learned only through many months of apprenticeship, now duplicated in your own home almost overnight with amazing and revolutionary Magic Screen methods. Decorate lamps, drapes, wall paper, fabrics. Produce beautiful and astounding effects possible in no other way. Fill orders for advertising signs and displays from stores, theatres, etc. Make and market your own toys, greeting cards and other high-profit items through stores all over U.S. and abroad.

TEXTILES SALE! CARDBOARD

PROFITS UP TO $5.00 AN HOUR OR MORE

Mr. J. S. C. of Washington earned over $400 while learning — some get orders within few hours after receiving supplies. Article selling for $20 costs you about $2 for materials and 3 hours of your time. Profits average up to $5 an hour or more!

LAMPSHADES

WE SUPPLY EVERYTHING YOU NEED TO START

Complete, step-by-step instructions, profusely illustrated, prepare you to start making money almost immediately. We supply all equipment you need — also advertising and sales materials, samples and exciting 12-Point Income Plan, for big profits and success. *No previous experience or artistic ability needed! You can do it!*

SEND NO MONEY—MAIL COUPON FOR
FREE FACTS AND SAMPLE

Examine complete 12-point Income Plan and equipment in the privacy of your own home, without risk. Mail coupon TODAY for free sample of Magic Screen work and complete fascinating free details. Write California Academy of Screen Process, Dept. 31, 5100 S. Vermont Ave., Los Angeles 37, Calif.

12 POINT INCOME PLAN

FREE! (Mail Now for Samples and Details) FREE!

CALIFORNIA ACADEMY OF SCREEN PROCESS,
Dept. 31, 5100 S. Vermont Ave., Los Angeles 37, Calif.

Rush **FREE** sample-facts-about Magic Screen and offer of 12-Point Income Plan and equipment for 7 day examination. No obligation on my part, now or ever.

NAME____________________AGE_____

ADDRESS__________________________

CITY & STATE_______________________

I HELPED T.E.H. MAKE $14 A DAY WHILE STILL LEARNING!

T. E. H.—West Virginia. "By the time I finished half your course, I was making $14.00 per day. I have made enough on the side to more than pay for the course."

H. T. ARMSTRONG

Learn ELECTRIC APPLIANCE REPAIR & SERVICE

WE TEACH:
How to Repair
Washing Machines
Vacuum Cleaners
Electric Ranges
Lamps, Motors,
Irons, etc.,

REFRIGERATION
and
House Wiring
At Home
In Your
Spare Time!

For a man handy with tools, and happiest when working with his hands, OPPORTUNITY is Wide Open Today in this great and growing field. Everyone is a customer for the man trained to service electric appliances.

Open Your Own Shop

Our practical HOME COURSE teaches you this business from A to Z preparing you to take a well paid job or open your own shop. You can actually start in your basement or garage with the tools we send you . . . before finishing.

We Include An ELECTRICAL APPLIANCE TESTER
A Big Kit of Tools at NO EXTRA COST

MAIL THIS COUPON for FREE BOOK

H. T. ARMSTRONG
PACIFIC TRAINING SCHOOLS
7217 So. Broadway, Dept M-511, Los Angeles 3, Calif.

Dear Sirs: Please send me, without obligation, your free booklet and complete details.

Name____________________

Address____________________

City__________ Zone____ State______

Take your choice!

TRAIN IN ONE OF THE FIVE FIELDS THAT *PAY* FOR SKILLED TECHNICIANS

- ★ AIR-CONDITIONING
- ★ REFRIGERATION
- ★ AUTO MECHANICS
- ★ BODY & FENDER REPAIR
- ★ AUTO PAINT & TINT

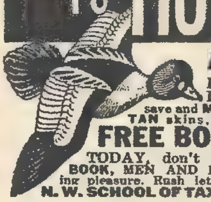
Learn your trade in mile high Denver at the foot of the majestic Rockies!

MID-WEST TRADES SCHOOL
639 E. 18TH DENVER COLO.

AIR CONDITIONING – REFRIGERATION
AUTO MECHANICS – BODY & FENDER

FREE! Write today for complete information in our catalog of courses. Enclose this ad and check the course above that interests you. I am a (check one) ☐ Vet ☐ Non-Vet

LEARN TO MOUNT BIRDS



ANIMALS, FISH, PETS

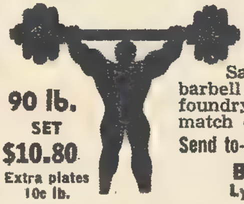
Be a Taxidermist. Save your hunting TROPHIES. Have a fine home-museum. Hunters, save and **MOUNT** your beautiful DUCKS, QUAIL, DEER, **TAN** skins, FURS. Great Fun. Spare-time **PROFITS.** **FREE BOOK** Tells ALL about it. 100 fine wild-game pictures, 48 pages. SEND TODAY, don't delay. Get this WONDERFUL **FREE BOOK, MEN AND BOYS.** Learn Taxidermy. Double your hunting pleasure. Rush letter or **POSTAL** today. **STATE YOUR AGE.**

N. W. SCHOOL OF TAXIDERMY, Dept. 2461 **Omaha, Neb.**

START YOUR OWN MONEY-MAKING BUSINESS

Clean painted walls for customers with highly efficient machine which is making BIG MONEY for others. No special skill or experience required. No shop or office needed. Operate business from your home. Write today for complete FREE information. Address:

VON SCHRADER MFG. CO. 168 PL. RACINE, WIS.



BARBELLS

90 lb. SET $10.80
Extra plates 10c lb.

Save Money — Buy the finest barbell equipment direct from our foundry — No other company can match our low price or value!

Send to-day for our FREE Barbell Catalog

BUR BARBELL CO.
Lyndhurst 36, New Jersey

MOST BIRTHDAY GIFTS ARE HARD TO CHOOSE BUT HERE IS ONE THAT JUST CAN'T LOSE.
See coupon on page 30

$600 BUILDS 4 ROOMS & BATH!

WHY PAY RENT?

For Six Hundred dollars and 30 days of your spare time you can build yourself this Beautiful Home.

Living room 10x15, Front bedroom 9x10, Back bedroom 10x11, Kitchen 8x10, Bath 5x7, Hall 3x4, Wind out steel Casement windows, Concrete block, stuccoed. $1.00 brings you Step-by-Step Instructions, Blueprint & Material List.

L. H. FARROW, Dept. B
Box 645 Columbus 16, Ohio

EARN MONEY IN UPHOLSTERING

Business of Your Own or a Good Job—Professional Home Training—Tools, Supplies, Equipment Included

Learn at home from experts. Simplified, fully illustrated training program. Full plans for establishing your business—profits big. Fine earning opportunities also in good jobs. Upholster your own furniture at fraction of cost. Valuable booklet free. Write now.

GENERAL TRADES SCHOOLS,
3810 Broadway, Dpt. MI-1, Chicago 13, Ill.

WHAM-O SPORTSMAN* $1.00 POSTPAID

HITS LIKE A .22 RIFLE—KILLS RABBITS, SQUIRRELS. Powerful, silent, accurate. For hunting, target, routing pests.

At dealers or send direct.

HUNTING SLINGSHOT

Heavy ash hardwood stock.
40 steel balls, extra rubber straps.
GUARANTEED. Send $1.00 today to
Wham-O Mfg. Co., Box M-8, South Pasadena, Calif.
* The professional model of Nat'l Slingshot Assn.

MIscellany

continued from page 39

Drain Cleaner

If you're bothered by clogged or sluggish drains, this pressure cleaner should prove helpful. It clamps to sinks, basins and tubs, utilizes water pressure and air pressure from an auto pump, paint sprayer or the like. It comes with seals to close adjoining drains to prevent escaping pressure and an indicator that tells you when it's all-clear. Vincent Di Marzo, U-Need-A-Drain-Cleaner Co., 949 Hoe Ave., Bronx 59, N. Y.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, AND CIRCULATION REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946

(Title 39, United States Code, Section 233)

Of MECHANIX ILLUSTRATED published monthly at Greenwich, Conn., for October 1, 1950.

1. The names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Fawcett Publications, Inc., Greenwich, Conn.; Editor, William Parker, Mamaroneck, N. Y.; Managing Editor, Ralph Daigh, Pelham Manor, N. Y.; Business Manager, Gordon Fawcett, Greenwich, Conn.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) Fawcett Publications, Inc., Greenwich, Conn.; W. H. Fawcett, Jr., Norwalk, Conn.; Marion Bagg, Kansas City, Mo.; Roger Fawcett, Greenwich, Conn.; V. D. Fawcett, Greenwich, Conn.; M. B. Fawcett, Norwalk, Conn.; H. A. Fawcett, Greenwich, Conn.; Roscoe Kent Fawcett, Greenwich, Conn.; M. F. Fawcett, Greenwich, Conn.; W. H. Fawcett Trust, Greenwich, Conn.; M. B. King, Oxnard, Cal.; Gloria Leary, Oxnard, Cal.; V. F. Kerr, Santa Barbara, Cal.; Mrs. Eva Roberts, Seattle, Wash.; Fawcett Publications, Inc., Greenwich, Conn.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trutees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

GORDON FAWCETT,
Business Manager.

Sworn to and subscribed before me this 26th day of September, 1950.
[SEAL] LILLIAN M. BUSHLEY.
(My commission expires April 1, 1953.)

HIGH SCHOOL IN SPARE TIME AT HOME CAN LEAD TO A BETTER JOB IN BUSINESS or INDUSTRY

You can take subjects which have *Real Job Value* and still earn graduation!

• This is *your* opportunity to make completion of high school *work* for you. Your AMERICAN SCHOOL home study course can include high school subjects closely related to your present job or the kind of work you want to do later. You can qualify for high school course diploma and benefit from course subjects that will aid greatly in winning promotions.

50 Job Help Subjects from Which to Choose

Our FREE, 44-page book of detailed information lists 100 high school subjects, of which 29 are technical and 21 are commercial. Whether you work in a shop, factory, garage or office you will find subjects of practical benefit in your climb toward better jobs at better pay. Some of these are Blueprint Reading, Mechanical and Machine Drawing, Tool Making, Foundry Work, Automotive subjects, Electricity—and Bookkeeping, Accounting, Secretarial Practice, Salesmanship.

Turn Spare Time Into Money

During more than 50 years American School has helped thousands to reach higher job goals by profitable use of spare time at home—and it can help *you*. Others have prepared for college entrance. If you have not completed high school, check that subject on the coupon below, add your name and address and mail it *right now*. Or if you are a high school graduate and are ambitious to succeed in the vocation of your choice, check that subject. Your coupon will bring you the book of information, without obligation of any kind. Mail it *now*.

AMERICAN SCHOOL
DEPT. G128, DREXEL AT 58th, CHICAGO 37

HOME - STUDY TRAINING SINCE 1897

PRACTICAL, EFFECTIVE

Take This First Easy Step

CHECK, CLIP AND MAIL COUPON NOW

AMERICAN SCHOOL, Dept. G128, Drexel at 58th, Chicago 37, Ill.
Without obligation, please send me FREE information on training course checked below.

☐ HIGH SCHOOL COURSES
☐ Accounting
☐ Air Conditioning
☐ Architecture & Building
☐ Automotive Engr.
☐ Aviation—Practical
☐ Aviation Drafting & Design
☐ Better Forem'nship
☐ Bookkeeping
☐ Business Mngmt.
☐ Contracting
☐ Diesel Engr.
☐ Drafting & Design
☐ Electrical Engr.
☐ Electricity—Pract.
☐ Electronics, Indus.
☐ Machine Shop Operations
☐ Mechanical Engr.
☐ Plastics Engr.
☐ Plumbing—Pract.
☐ Private Secretary
☐ Radio Operating & Servicing
☐ Railway Training
☐ Refrigeration
☐ Sheet Metal Pattern Drafting
☐ Shop Management
☐ Tool Making

*Name*__________ *Occupation*__________
*Address*__________ *Age*__________
*City & Zone*__________ *State*__________

WANT TO
SAVE GAS?
BE PREPARED IF RATIONING RETURNS
1/4 MILLION NOW IN USE

TRY IT FREE IN YOUR CAR
TEST FOR
✓MORE MILEAGE ✓FASTER PICK-UP
✓EASIER STARTING ✓BETTER IDLING

You can install it easily in a few minutes.

THE AMAZING GANE AIR FLOW NEEDLE
Gane replaces the idling adjustment screw in gasoline carburetors.

Holes for Air Flow

MANY GANE NEEDLE USERS REPORT up to 25% more mileage, faster pick-up, easier starting and smoother idling. TRY A GANE NEEDLE IN YOUR CAR for ten days at our expense, then compare your mileage and performance. If fully satisfied, send only $1.50 per needle (8 cylinder cars take 2). If not satisfied, just return it—FAIR ENOUGH? Since authorities differ on its merits and some users report no improvement, TRY BEFORE YOU BUY!

Write today. Enclose no money. Pay postman nothing. Send us your name, address, make and year of car—and the make of carburetor if convenient.

Economy in Driving

BOOK SENT FREE! This auto economy manual is sent *absolutely free, to all who try Gane Needles.* It tells how to save gas, tires, brakes and tells how you can gain more power, speed and better performance from your car. This combination manual-catalog also introduces many new and ingenious economy products.

NATIONAL AUTOMOTIVE RESEARCH CORP., Dept. K-1
350 West Washington Blvd. Venice, Calif.

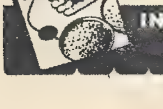
MoToR's New Pocket-Size Book
Spots 1760 Car Troubles—In a Jiffy!

MoToR's New TROUBLE SHOOTER for AUTO MECHANICS
$1

When you have MoToR's new "Trouble Shooter"
Handy, pocket-size, indexed manual lists 1760 CAUSES of car troubles and tells WHERE to look for them. Saves you hours of time and work on difficult jobs. Covers engines, clutches, brakes, ignition, etc. Section on automatic transmissions alone is worth more than price of book! Spiral binding; book stays open while you work. Send no money—just pay postman $1, plus postage and C.O.D. charges. If not satisfied, return book in 7 days for refund. Or SAVE C.O.D. charges by sending only $1 NOW. Same return-for-refund privilege. MoToR Book Dept., Desk 31T, 250 West 55th St., New York 19, N. Y.

MAKE EXTRA MONEY PLASTICS LEARN AT HOME

LEARN HOW TO MAKE fast selling
PLASTIC
NOVELTIES
FURNITURE
JEWELRY
SIGNS
TOYS
LAMPS



There are RICH OPPORTUNITIES for MEN and WOMEN with "know-how" in Plastics. Interstate's amazing new Plastics course tells and shows how to make hundreds of fast selling items out of Plastics. Gives complete training in fabrication, casting, lamination, molding, etc., in simple, easy, step-by-step language and pictures.

START A PLASTICS BUSINESS OF YOUR OWN. No other industry holds such promise for the future. You can make big money manufacturing novelties, toys, signs, etc., in your own home in spare or full time. Don't wait! Learn NOW how Interstate's Plastics Training qualifies you for success in the plastics field.

Write for FREE Information Today!

INTERSTATE TRAINING SERVICE
School of Plastics
PORTLAND 13, OREGON (Dept.4A)

HOME PHOTO LAB & COURSE $4.99!

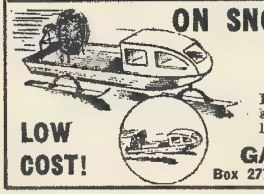
COMPLETE HOME PHOTO DEVELOPING, PRINTING LAB OUTFIT AT HALF THE PRICE OFFERED IN STORES! Includes printer and light box—3 developing trays, 3 packs developer and fixer, 25 sheets of 4x6 photo paper, stirring rod, safelight, 4 oz. graduate, thermometer, 100 art corners, BEGINNING PHOTOGRAPHY COURSE AND HOW YOU CAN EARN $25.00 to $50.00 A WEEK making pictures, photo cards and developing films for others. APPROVED BY PROFESSIONALS. Boys and girls can LEARN IN A FEW HOURS. IDEAL START IN PHOTOGRAPHY FOR ANYONE! SEND ONLY $1.00 (bill, ck, mo) and pay postman $3.99 plus COD postage or send $4.99 plus 40c postage for p.p. delivery. ORDER YOUR LAB NOW AND START EARNING MONEY IN PHOTOGRAPHY THE FIRST WEEK!
MIDWAY CO. Dept. FMI-1 KEARNEY, NEBR.

LEARN AT HOME
LOCKSMITHING

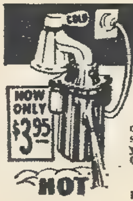
YOU CAN EARN BIG MONEY ALL YEAR ROUND IN FULL OR SPARE TIME! Locksmiths are always in big demand! Age or physical handicap is no disadvantage in this respected, permanent field. Learn how to make keys, fix locks, make duplicates, etc. Practical, illustrated lessons by experts show you how! All materials and special tools supplied. Send for FREE booklet. LOCK INSTITUTE, Dept. M-12, 55 Park Ave., Rutherford, N. J.

Locksmithing & Keymaking
HOME TRAINING OUTFIT INCLUDES KEY MACHINE, SUPPLIES AND TOOLS NECESSARY TO GET STARTED IN YOUR OWN BUSINESS
Excellent full or part time earning opportunities. Professional outfit includes supplies, tools, key cutting machine. Get practical training from Master Locksmiths on house locks, auto locks, padlocks, etc. Learn to cut keys by code, master locks, change combinations, quickly identify key blanks, many profitable "tricks of the trade." Booklet of Information FREE. Write today.
UNITED SUPPLY & SERVICE
3327 Madison St., Dept. MI-1 Chicago, Illinois

WORKSHOP CHARLIE STARTS IN LIVIN'
WHEN HE GETS THAT GIFT YOU'RE GIVIN'
See coupon on page 30



ON SNOW, ICE & WATER
• MAKE BIG MONEY WINTER & SUMMER
Power unit complete with plans at low cost. Write for free booklet & details.
LOW COST!
GAARE SUPPLY CO.
Box 277, Dept. Y, Weatherford, Texas

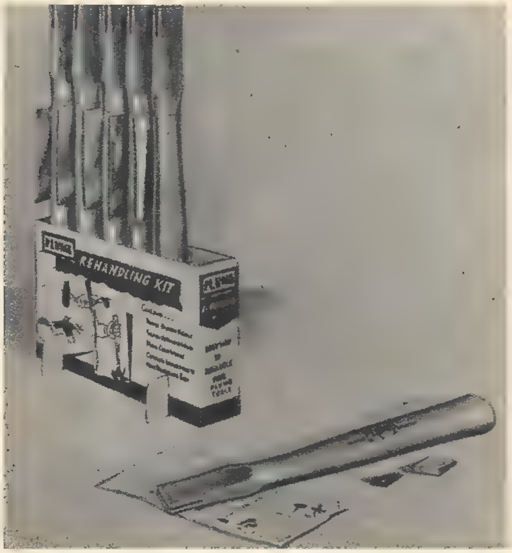


HOT RUNNING WATER!
Attaches easily, quickly to any standard faucet. Regulates temperature by turning faucet. Operates AC or DC. Comes with 8-ft. rubber cable and plug. Our DELUX heater has delighted many thousands of users. Send $3.95 cash, check, or M.O.—we will ship prepaid or, if you wish, we will ship C.O.D.—you pay postman $3.95 plus few cents postage. Order 3 for $10—save $1.85.
METROPOLITAN ELECTRONICS CO.
Dept. 191, 106 Fifth Avenue, New York 11, N. Y.

Play GUITAR in 10 DAYS
OR GET YOUR MONEY BACK!
Let Ed Sale teach you to play with his famous diagram photo system. Book contains 53 photos, 43 diagrams showing exactly how to place your fingers. Gives you 110 popular songs, words and music—along with complete, easy to learn instructions. Imagine your joy when you find after only two weeks you are playing beautiful music! Amaze your friends! Be the life of the party! SEND NO MONEY. Pay Postman $1.95 Plus Postage. ED SALE, Dept. MI-1, Point Pleasant, New Jersey.

NEW for the SHOP

Odorless paint, by the Keystone Paint and Varnish Co., Brooklyn, N. Y., can be applied in a closed room with no discomfort to any of the occupants.



Consisting of a handle, two wedges, and simple instructions, this kit allows anybody to replace a hammer handle. Available at hardware stores.

Build your Career in

ELECTRICAL POWER

through

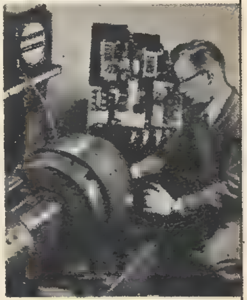
This Plan-

CAREER-OPPORTUNITIES are being created by essential, long-range expansion programs in Electrical Power fields. This 47-year-old non-profit school offers the following *plan* whereby the young man can prepare *realistically* for these opportunities.

FIRST—Become an Electro Technician in 12 Months

Equip yourself for Technician's work in powerhouse, manufacturing, drafting, laboratory, contracting and related electrical fields.

NEXT—You Can Become an ELECTRICAL ENGINEER



You can immediately or at any future date apply your Technician's certificate as full credit toward a B.S. degree in Electrical Engineering. Thus, in 24 additional months, you achieve a major in Electrical Power. In the final stage of this college program you receive an extra service. Your aptitudes and desires are analyzed scientifically — thereby guiding you to choose specialized preparation for design, research or graduate study — manufacturing production — or engineering sales and management.

• • •

To Enter ELECTRICAL SERVICE in 6 Months

If you have only six months' time, here is an intensive, practical 6-month course — complete in itself — to prepare for earnings in work such as wiring and appliance maintenance, motor and generator service, estimating and contracting.

MILWAUKEE

SCHOOL of ENGINEERING

Technical Institute • College of Electrical Engineering

Military, practical or prior academic training evaluated for credit. Preparatory courses available. Over 1500 enroled. Terms open April, July, October, January.

FREE — *"Occupational Guidance Manual" and 1951 catalog.*

1951
Cata
Issu

MILWAUKEE SCHOOL OF ENGINEERING
Dept. MI-151, 1020 N. Broadway, Milwaukee, Wis.

Without obligation, rush following:
☐ Occupational Guidance Manual: ☐ 1951 Catalog; plus facts on course in ☐ Electrical Service ☐ Electro Technician ☐ Electrical Engineering (Power) ☐ Radio ☐ Television ☐ Electrical Engineering (Electronics) ☐ Heating ☐ Refrigeration ☐ Air Conditioning ☐ Welding.

Name________________________Age________

Address________________________________

City____________________Zone____State__________

☐ **Check if World War II Veteran**

Can a Man MY Age Become a Hotel Executive

Even Though He Has No Previous Hotel Experience?

Would you like to step into a well-paid position as Hotel, Club, Restaurant, or Inn Manager, Purchasing Agent, Social Director, or Assistant Manager? Would you like to look forward happily to the future? The success of Lewis graduates from 18 to 50 PROVES you can—though you have no experience in hotel work.

Harry E. Roorbach, Veteran, Wins Success as Hotel Executive

"While I was in the hospital awaiting discharge from the U. S. Navy, I enrolled for Lewis Training. Shortly after I had completed the course, the Lewis National Placement Service informed me of an opening near my home.

"At present, I am Night Manager in the largest hotel in Rochester. I owe my success to the Lewis Course."

Step Into a Well-Paid Hotel Position
FREE Book Gives Fascinating Facts

Our FREE Book, "Your Big Opportunity" explains how you can qualify for a well-paid position at home, in leisure time; tells how you are registered FREE of extra cost in the Lewis National Placement Service. Most important, it shows how you can be a Lewis Certified Employee—certified to "make good" when placed in a position. Mail the coupon NOW!

Course approved for Veterans' Training.

Lewis Hotel Training School
Room TA-6424, Washington 7, D. C.

35th SUCCESSFUL YEAR

Send me the Free Book, "Your Big Opportunity," without obligation. I wish to know how to qualify for a well-paid position at home, in my leisure time.

Name ....
(Please Print Name & Address)
Address ....
City............................ Zone...... State............
☐ Check here if eligible under G.I. Bill of Rights.

NEW
QUICK EASY!

AUTO WASHER

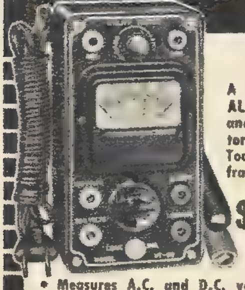
Your car sparkling clean—in a jiffy—magic "sponge" cleaning-cloth. Simply glide over car. PRESTO! Dust, grease, dirt, and grime disappear in a jiffy. Leaves finish clear, lustrous. Autos gleam like a mirror.

SAMPLES for AGENTS

Sample offer sent immediately to all who send name at once. Penny postal will do. Send no money—JUST YOUR NAME.

KRISTEE CO., Dept. 777, Akron 8, Ohio

REPAIR ALL ELECTRICAL APPLIANCES and UTILITIES



UTILITY TESTER

A precise instrument for testing ALL electrical circuits and appliances, such as Ranges, Refrigerators, Ironers, Washing Machines, Toasters, etc., and motors from fractional H.P. to 2 H.P.

$13.90 with all instructions

• Measures A.C. and D.C. voltages, A.C. and D.C. current, resistances, etc. • Measures current consumption while appliance under test is in operation. • Locates breaks—shorts—opens. • Tests bulbs, radio tube filaments, pilot light lamps, all type fuses, fluorescent bulbs, etc.

SHIPPED ON APPROVAL—Send no money with order or pay anything on delivery. Try it for 10 days. If completely satisfied, remit $13.90. If not, return the instrument — no explanation necessary.

SUPERIOR ELECTRONIC CO., INC.
Dept. A-7 • 227 FULTON ST. • NEW YORK 7, N.Y.

NO MONEY WITH ORDER — NO C.O.D.

SHORTHAND in 6 Weeks at Home

Famous Speedwriting system. No signs; no symbols; no machines; uses ABC's. Easy to learn; easy to write and transcribe. Low cost. 100,000 taught by mail. Also typing. 28th year. Write for FREE booklet.

Speedwriting®
Dept. 1701-1, 55 W. 42 St., New York 18

Learn CARPENTRY BRICK LAYING

Get into the billion dollar building trades. Learn now while opportunities are greatest. Train in our completely equipped shops under expert instructors. G.I. Approved. Enroll now. Limited Classes. Write for FREE catalog.

MIDWEST SCHOOL OF BUILDING TRADES, Dept. MI-1
411 N. Center St. Bloomington, Ill.

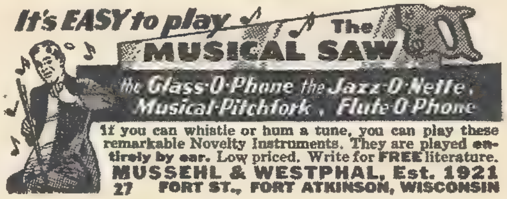
WATCH REPAIRING

FREE SAMPLE LESSON

LEARN HOW—NOW—THROUGH HOME STUDY!
Investigate our successful methods.
Write today!

CHICAGO SCHOOL OF WATCHMAKING
1608 MILWAUKEE AVENUE, DEPT. 611, CHICAGO 47, ILL.

IF YOU WERE RICH AS ROCKEFELLER
YOU COULDN'T GIVE A GIFT THAT'S SWELLER
See coupon on page 30



It's EASY to play The MUSICAL SAW

the Glass-O-Phone the Jazz-O-Nette, Musical-Pitchfork, Flute-O-Phone

If you can whistle or hum a tune, you can play these remarkable Novelty Instruments. They are played entirely by ear. Low priced. Write for **FREE** literature.

MUSSEHL & WESTPHAL, Est. 1921
27 FORT ST., FORT ATKINSON, WISCONSIN

SPECIAL OFFER!

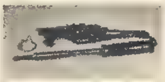
$1. [illegible]

LOCK-STITCH SEWING AWL

Famous, patented lock-stitch sewing awl complete with needles, waxed thread and direction folder. Hundred uses — sewing, repairing leather goods, canvas, belting, harness, saddles, gun cases, awnings, golf bags. Extra needles and thread available. Satisfaction guaranteed or money back. Send currency, check or money order.

Yates Mfg. Co., 611-TT Main St., Lake Geneva, Wisconsin

LOOK AT THIS!!



SOLDERING IRONS
24 V. D.C. 100 Watts Mfg. by Vulcan Elec. Co. Complete with 11 ft. cord, plug, and iron rest.
New ______$1.25 ea.

WESTON METER
Registers 30 amps. and 30 volts D.C. 2¼" black face luminous dials. Complete with shunt and mounting screws.
New ______$6.00 ea.

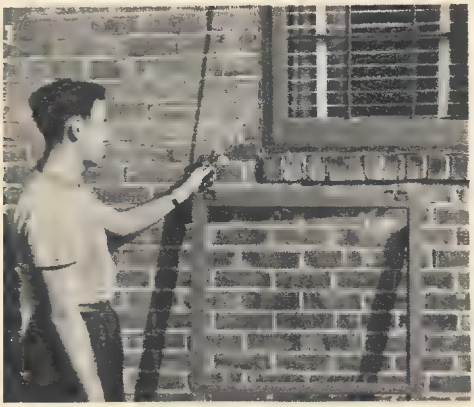
ADJUSTABLE PILOT LIGHTS
can be made dimmer or brighter by turning amber only. State which.
New ____4 for $1.00

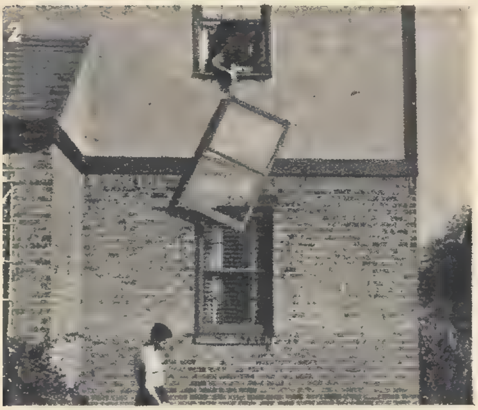
No C.O.D.'s You pay postage All sales final Minimum order $1.00

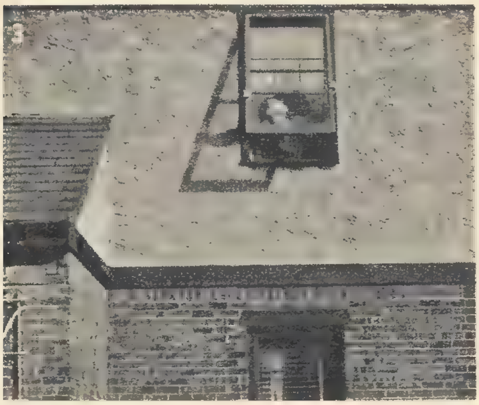
GENERAL SURPLUS CO., 114 Third Avenue, Bklyn. 17, New York

Hoist 'Em Up!

ONE of the most irksome—and dangerous—jobs around the house at this time of year is the installation of storm windows. The system described here is safe, simple and snappy. (1) Make a 3-in. fish hook from iron rod, and tie it to one of the hangers. (2) Hoist the sash up, and (3) fasten in place. Time of entire operation: about ten seconds. •







FOCUS
YOUR
MENTAL
POWERS

DO YOU THINK IN CIRCLES?

Do you ask yourself, "How shall I begin; what shall I do next?" Have you a confusion of ideas? Mastery in life, success in any enterprise, comes from the subtle ability to marshal your thoughts, to call to the fore, when an emergency arises, the proper mental powers. Mentally, you are an aggregate of forces. Why dissipate them because of lack of knowledge of how to properly use them? Learn to unite them, and you will have at your command, a *tremendous power* for accomplishment.

SEND FOR FREE BOOK

The Rosicrucians have preserved for centuries knowledge of the secret method for the development of mind power and the direction of man's unused inner faculties. This wisdom, not strange or mysterious, has changed the course of life for many men and women throughout the world. Write for the free, sealed book which explains how you may obtain this helpful information. Address: Scribe X.L.A.

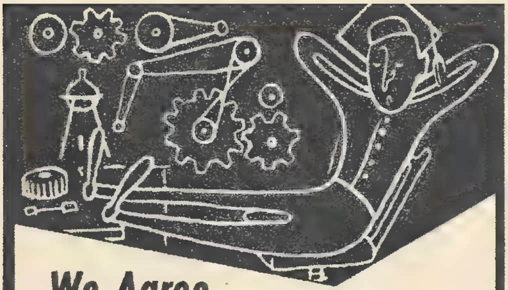
The ROSICRUCIANS
[AMORC]
San Jose California

— USE THIS COUPON —

Scribe X.L.A.
The Rosicrucians
San Jose, California

I am sincerely interested in an intelligent method for attaining a mastership of life. Send me without obligation, your FREE Book which explains how I may receive and use your age-old method.

Name..
Address..
City..



We Agree . .

"INVENTORS ARE LAZY PEOPLE"

Take Thomas Edison; tired of gas lamps, he invented electric lights. Or Henry Ford, he'd rather ride than walk—result, the Model "T." George Eastman wanted a picture without painting, so . . . the science of photography advanced.

For our money we're betting on the lazy inventor. Lazy or enterprising, we in Rochester know American industry cannot progress without inventors. That's the reason for the Rochester Plan. It's the inventor's link to manufacturing and marketing.

For further details on the Rochester Plan write to:

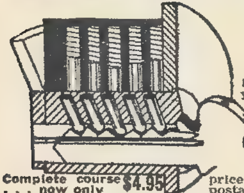
DIVISION OF PUBLIC RELATIONS
54 Court St., Rochester 14, N. Y.

ROCHESTER DEPT. OF COMMERCE
ROCHESTER, NEW YORK

"In Rochester, Government Helps Business"

WORLD'S SMALLEST RADIO $4.99 made today. CIGARETTE PACK SIZE—A REAL RADIO—NOT A TOY! NO TUBES, BATTERIES OR ELECTRIC "PLUG-INS" NEEDED! NEW SELECTIVE CIRCUIT. Red plastic. GUARANTEED TO WORK on local stations if used as directed or money back! USE MOST ANYWHERE! **SEND ONLY $1.00** (bill, ck, mo) and pay postman $3.99 COD plus postage or send $4.99 for p.p. delivery. COMPLETE WITH EXTRA LONG DISTANCE AERIAL KIT AND PHONE. Wonderful gifts. LIMITED SUPPLY—ORDER NOW!

MIDWAY CO. Dept. BMI-1 KEARNEY, NEBR.



Locksmithing

AND KEY MAKING

Now Made Easy!

Practical up-to-date course teaches you how to pick locks, de-code, make master keys, repair, install, service, etc. New self-instruction lessons for every handyman, homeowner, carpenter, mechanic, service station operator, fix-it shop, hardware dealer, gunsmith. 53 easy illustrated lessons. Full price only $4.95 postpaid; or C.O.D. plus postage. Satisfaction or refund guaranteed.

Complete course . . . now only **$4.95**

Nelson-Hall Co., 210 S. Clinton St., Dept. A-3, Chicago 6, Ill.

LEARN TELEVISION RADIO-ELECTRONICS

Learn in your home. Then earn BIG PAY and SECURITY. Tremendous growth has made more jobs than there are trained men! NOW is the time to get into this NEW, RICH field of OPPORTUNITY. FREE placement service. SEND FOR FREE, BIG ILLUSTRATED CATALOG.

MAIL TODAY

I want complete information on how to succeed in Television, Radio, and Electronics. This does not obligate me in any way.

NAME ____________________

ADDRESS ____________________

CITY ____________________ STATE__________

CENTRAL RADIO & TELEVISION SCHOOLS
Dept. M-1, 1644 WYANDOTTE, KANSAS CITY, MO.

Make 'Em with MI PLANS

Build these projects with the simple, easy-to-follow Mechanix Illustrated Plans. All are complete with drawings, detailed instructions and specifications.

MODEL PLANS

SKYHOPPER Plan No. 363 $ .25 ☐
This 30-in., Class C rubber-powered job really lives up to its name. Can be built in a weekend for less than one dollar.

SPITFIRE Plan No. 419 $ .50 ☐
A 28-in. control-line model of the famous R.A.F. fighter plane. Can be powered with .19 to .35 engines. Simple to construct.

BOUNCIE II Plan No. 388 $ .50 ☐
When over 6,000 enthusiasts have built a model, you know there's something to it! This 30-in. runabout model will use any .19 to .65 engine, and will feel at home on your mantelpiece or in water.

ELECTRA II Plan No. 403 $ .50 ☐
A snappy cruiser model made of white pine and balsa, 32-in. Electra will run on a lantern battery or .19 to .60 engines.

DIESEL LOCOMOTIVE Plan No. 418 $ .25 ☐
No rails are required for this 10-in. reproduction of a slick engine. Operates on two flashlight batteries.

CHEVROLET Plan No. 407 $ .25 ☐
Patterned after the Styline sedan, this is one of the most popular MI models. It's 10½ in. long, powered by a miniature electric motor.

BOAT PLANS

CHUM Plan No. B-187 $1.50 ☐
Very simply constructed 13-ft. flat-bottom plywood rowboat. Beam: 4½ ft. Weight: 140 lbs. Can be rowed or used with a small outboard.

LI'L PUTT Plan No. B-170 $1.00 ☐
Built from plywood and fir, this 8½-ft. outboard speedster will do over 30 mph with a 10-hp motor and about 18 mph with 3½ hp.

SCUD Plan No. B-185 $2.50 ☐
Comfortable 14-ft. outboard runabout does 30 mph with a 22-hp motor. Weight: 250 lbs. Constructed of exterior-grade plywood.

SANDPIPER Plan No. B-184 $4.00 ☐
This attractive and unusual little auxiliary schooner is 24 ft. long and sleeps two people. Draft: 3 ft. Sail Area: 316 sq. ft. Conventional planking.

ISHKOODAH Plan No. B-190 $3.00 ☐
Modern express cruiser with accommodations for two. Length: 25 ft. Speed: 25 mph. The V-bottom hull is conventionally planked.

MISCELLANEOUS PLANS

PORTABLE TELESCOPE Plan No. P-6 $2.00 ☐
These easy-to-follow plans will show you how to build a superb 200-power instrument for less than 30 dollars!

TRAILER FOR TWO Plan No. HJ-12 $2.00 ☐
Easily built and no trouble to tow, this 10-ft. streamlined home on wheels contains complete cooking facilities. Ideal for hunting and fishing trips.

UTILITY WORKBENCH Plan No. HJ-13 $ .50 ☐
Ordinary lumber and common hand tools will suffice to construct this basic shop item. Plans are to scale, with complete instructions.

35mm ENLARGER Plan No. P-4 $ .50 ☐
A miniature camera is used in the construction of this enlarger. Instructions are complete with detailed drawings.

CONTACT PRINTER Plan No. P-1 $ .50 ☐
Takes up to postcard size as well as 4x5-in. negatives. Full-size plans may be used as templates.

SLIDE PRINTER Plan No. P-5 $1.00 ☐
At last—an inexpensive device which enables you to project those 35mm or bantam negatives to nearly life-size proportions.

PARALLEL ARM ENLARGER Plan No. P-2 $1.00 ☐
Accepts negatives from 35mm to 4x5 in., and can be built around an Argus, Leica, 4x5 Graphic, or similar cameras.

Send remittance for each plan checked to Mechanix Illustrated Plan Service, Fawcett Publications, 12 Fawcett Place, Greenwich, Conn.

"A FASCINATING...MONEY-MAKING art career can be yours America's 12 Most Famous Artists Show You How!"

says **NORMAN ROCKWELL**

We show you our successful methods and art secrets...you learn them at home, in your spare time. Write for our big, handsomely illustrated free booklet that tells how you can have a great new art career! **WRITE TODAY!**

FACULTY

Norman Rockwell	Al Parker
Jon Whitcomb	Ben Stahl
Stevan Dohanos	Robert Fawcett
Peter Helck	Austin Briggs
Harold Von Schmidt	John Atherton
Fred Ludekens	Albert Dorne

FAMOUS ARTISTS COURSE

· FAMOUS ARTISTS COURSE ·

FREE Dept. 5-M, Westport, Conn.
Please send book about
your home study art course.

Mr. Mrs.
Miss .... Age ....

Street ....

City, Zone, State ....

No Shop Needed

Operate YOUR OWN Business

Clean and Mothproof Rugs and Upholstery

Can you qualify? . . . If you are dependable, honest and willing to work, send for FREE Booklet explaining how you can become "your own boss" in a growing business of your own. You'll use proven successful methods of established DURACLEAN Dealers. Service rendered "in the home," offices and public buildings. Easy to learn.

DURACLEAN cleans by absorption! No scrubbing. No soaking or shrinkage. Fabrics dry in just a few hours. Dirt, grease and many unsightly spots vanish as if by magic . . . colors revive. Upholstery and floor covering last longer.

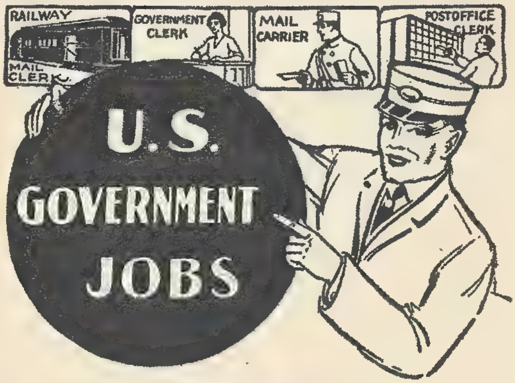
DURAPROOF kills moths and carpet beetles. Makes material resistant to both! Another year 'round service. DURAPROOF to our knowledge, is the only moth proof service backed by a National Money Back, 4 YEAR WARRANTY for your customer's protection.

These services are Nationally Advertised! Leading furniture and department stores recommend DURACLEAN Dealer's service. Almost every building in your territory houses a potential customer. Even auto dealers buy your service to revive upholstery in used cars.

Some dealers establish a shop or an office after business has grown. Others continue to operate from their own home. Profits up to $15 and $20 for a day's service on EACH of your service men.

Territories are limited! Write immediately for FREE Booklet and Easy Terms. No obligation.

DURACLEAN CO., 1-171 Duraclean Bldg., Deerfield, Illinois



START AS HIGH AS $3,450 YEAR

Many 1951 Examinations Expected. Prepare NOW! Veterans Get Special Preference! 40 Page Civil Service Book FREE Mail Coupon Today SURE

★

COUPON

Franklin Institute
Dept. M-78,
Rochester 4, N. Y.

(Not Government Controlled)

Gentlemen: Rush to me, FREE of charge, list of U. S. government big pay jobs. Send FREE 40-page book describing salaries, vacations, hours, work, etc. Tell me how to qualify for one of these jobs.

Name ....

Street ....

City.. Vet?..........

mi MECHANIX ILLUSTRATED

classified section

save money order by mail

Your advertisement can reach this mail-buying audience of nearly 2½ million readers for only 70c per word . . . payable in advance . . . minimum 10 words. Copy to be inserted in March issue must be in the office January 3. Mail to MECHANIX ILLUSTRATED, 67 West 44th Street, New York 18, N. Y. Word count: Zone number free. Figure one word: Name of state (New Jersey); name of city (New York); sets of characters as in key (14-D); also abbreviations as 35MM, 8x10, A.D. A.C.

ADVERTISING SERVICE & AGENCIES

ADVERTISE: 24 WORDS, 40 Newspapers $3.50. Lists Free. Advertising Bureau, 10511-B Springfield, Chicago 43.

AGENTS WANTED

EXTRA CASH—Easy! Sell friends newest design 21 for $1.00, Dark Card, Novelty All-Occasion greeting card assortments, Gift Wraps, Animated Books. Profits to 50c per $1.00 box. Special offers. Bonus. Experience unnecessary. Write today for free samples. Name Imprinted Scented Stationery, Napkins, Book Matches, feature assortments on approval, free catalog, selling plans. Elmira Greeting Card Co., 2133 Elmira, New York.

TREMENDOUS PROFITS Selling Sunshine Cards, America's most distinctive Greeting Card Line. Amazing values, 21 Everyday Cards with lined envelopes, Bonnie Notes, Clever Comics Assortment, Gift Wraps, Stationery, Napkins, plus many more top items. Act Now! Write for Sample Kit on Approval. Sunshine Art Studios, Dept. MS-2, 115 Fulton Street, New York 8, N. Y.

MAKE MONEY Calling On Friends! Show nationally advertised Greeting Card Assortments—new All-Occasion Assortment and laugh-packed Barrel-of-Fun Assortment. Sells for $1.00—up to 50c profit for you! Also Personal Notes, Gift Wrappings, Stationery, Gift Items, others! Get Two assortments on approval. Write Wallace Brown, 225 Fifth Ave., Dept. R-4, New York 10.

NO EXPERIENCE needed to make money fast for yourself or organization. Sell gorgeous new All-Occasion assortments. 21 cards $1.00. Valentines, Easter Cards, Religious, Novelties, unusual gifts. Scented Stationery, Notes, Wrappings. Over 100 items. "Get Started" plan. Write for samples on approval. Hedenkamp, 361 Broadway, Dept. MI-6, New York.

SCHOOL SENIORS! A postal will bring you our wonder, Kwick-Sell Cardalog of popular Graduation Name Cards. Biggest profits! Only firm giving free Golden Memory Book & Souvenir Chest. Don't miss out. Hurry that postal! Craftcards, Box 235 (AF), Pittsburgh 30, Penna.

DO YOU Need Money? $40.00 is yours for selling only 50 boxes All-Occasion greeting cards. And this can be done in a single day. Free samples. Other leading boxes on approval. Surprise items. Experience unnecessary. Free samples Personalized Stationery, Napkins. Write today. It costs nothing to try. Cheerful Card Co., 74 White Plains, N. Y.

AT LAST! Something New and Sensational in Everyday Cards, 21 for $1. Make Extra Money Fast! Show Satin, Velour, Metallic Cards. Get orders easy. Big line $1 Assortments, Scented Stationery, Personal Matches, Kiddie Books. Imprints Free. Two $1 boxes On Approval. Puro Co., 2801 Locust, Dept. 164-A, St. Louis 3, Mo.

"LAUNDRY MARKING Pen" sells at $1 like hotcakes! Every housewife wants it! Writes on wool, cotton, rayon, leather! Prevents losses, mixups! "Red hot" sideline and door-opener! Your cost: $7.20 dozen. Samples, $1 each. Try one dozen; you'll soon get 'em by the gross! Taubman, Inc., Dept. X, 1 West 34th, New York 1, N. Y.

BARGAINS! SAVE up to 50%. Hosiery, Lingerie, Toys, School Supplies, Blades, Novelties, Carded Goods, Drygoods, Cosmetics, Stationery, Jewelry, Notions, Perfume, Soaps, etc. Send 10c for illustrated 1000 Bargain Catalog. Valuable surprise gift Free with first order. Reliable Jobbers, 311-C North Desplaines, Chicago 6.

SCHOOL SENIORS—Earn sensational profits selling classmates America's most beautiful Graduation Name Cards. Largest Selection. Outsells all others. Free Sample Kit. Printcraft, Dept. 1, 1425 E. Elm St., Scranton 5, Penna.

BRAND NEW! Amazingly different and smart Everyday Cards, 21 for $1. Magic Window Designs. Take Easy orders. Make up to 100% Cash Profit. Big line $1 Assortments, Personal Stationery, Imprinted Matches. Free Imprint Samples. Assortments on Approval. North Star, 31 Glenwood, Dept. P-65, Minneapolis, Minn.

PHOTO-SALESMEN-AGENTS. Sell beautiful hand colored plastic enlargements and sensational new photo compacts, rings, bracelets, lockets, etc. Collect deposit, we deliver. Profitable sideline. Send card, for Free sample kit. Novel Portrait Co., 3343-B North Ave., Chicago, Ill.

EXCELLENT SIDELINE for printing and advertising salesmen. Decalcomania name plates in small quantities. Great demand. Also, make money with our line of Automobile Initials and Sign Letters. Free Samples. "Ralco." XL-Roxbury, Boston 19, Mass.

BE A Money Maker . . . Represent magazines year around. Wonderful home work. Big Christmas profits now. Liberal commissions. Everything furnished. Write for Free catalog. McGregor Magazine Agency, Dept. 520A, Mount Morris, Ill.

FREE SAMPLES. Big profits showing amazing Glow-In-The-Dark specialties. House numbers, pictures, plastic novelties, ashtrays, keyholders, religious and nursery objects, etc. Madison Plastics, 303 Fourth Ave., New York 10, N. Y.

WOMEN WHO Can Sew And Alter dresses, make extra money part time taking orders for big manufacturer. All sizes. Amazing values. Everything furnished. Harford Frocks, Dept. D-235, Cincinnati 25, Ohio.

ABSOLUTELY FREE! Big package actual sample fabrics and style presentation of dresses, lingerie, hosiery, etc. Take orders. Commissions big. Send no money. Melville Co., Dept. 7015, Cincinnati 3,

BIG MONEY Taking Orders: Shirts, Ties, Sox, Pants, Jackets, Sweaters, Shoes, Uniforms, Etc. Sales equipment free. Experience unnecessary. Nimrod, 4922-DO, Lincoln, Chicago.

NEW "SPONGE" Wall Cleaner. Erases dirt like magic. Wallpaper, painted walls, ceilings. Saves redecorating. Lightning seller. Samples sent on trial. Kristee 121, Akron, Ohio.

BUY THOUSANDS of nationally advertised products direct from manufacturers and distributors. Write for "Buy Direct and Save." Service Publishing, 1420-C Investment Bldg., Pittsburgh 22, Penna.

EASY MONEY, Wonderful Work. Mix water with our Concentrates. Make Flavors, Lotions, Perfumes, Shampoos, Cleaners, Polishes, 125 products. Free Catalog. Quaico, K20030 Russell, Detroit 3.

WHERE TO Buy 800,000 articles and nationally advertised merchandise direct from manufacturers and jobbers. Sent Free. "Buy Direct and Make Bigger Profits." Glass Pub. Co., Ellwood City 4, Pa.

FREE COMPLETE Sales Kit. Sell personal initialed belts and buckles, cap badges, tie holders, etc. Choice of 2000 emblems. Write for free selling outfit today. Hook-Fast, Box 1425MI, Providence, R. I.

"FORTIFY THE FUTURE." Start own business; home, office. Booklet describing "Collection of 137 Tested Plans" free. Elite Co., 220-G Grand St., New York 13, N. Y.

SELL BIG money-maker to men and women. Easy handwork makes fast-selling useful articles. Sample free. Sunmade Company, Brockton 64, Mass.

SALESMEN, DISTRIBUTORS: Fast Selling jewelry items: direct factory connection. Pickering Company, 19M Bank, Attleboro, Mass.

TAKE LARGE Unit Orders With Wool And Cotton Uniforms, Initial Buckles, Belts, Badges. Choice 3,000 Emblems. Prospects Everywhere. Write Hook-Fast, Box 480-MI, Roanoke, Va.

$250 WEEK REPORTED! Book "505 Odd Successful Businesses" free. Work home. Expect something Odd! Pacific-E, Oceanside, Calif.

SELL DRUGS Sundries!!! Balloons, Combs, Novelties. Razor Blades, Specialties, Carleton House Distributors, Texas City, Texas.

$5 HOUR EASY! Sell name plates for houses. Free Sample, order blanks. Write: National, 214 Summer, Boston, Mass.

NAIL NOURISH. Wonderful For Women. Description From -E-Z-ON-, 1009 Harvard, Evanston 14, Ill.

DRESSES 18c; COATS $1.00; Blouses 35c. Free Catalog. Crown, 164-PF Monroe Street, New York.

"FOG-STOP" Windshield Cloth. Instantly removes blurry Mist, Frost, Sleet, Snow. Stops windshield fogging. Samples sent on trial. Kristee 122, Akron, Ohio.

AVIATION

PROPELLERS, PLANS, supplies for ice sleds, snow sleighs, air boats. Catalog 20c, Banks-Maxwell, Box 3301D, Ft. Worth, Texas.

classified section

BULLET RACEPLANE.—Homebuilt, Speedy, Monoplane. Blueprints $2.00. Corbcraft, 80-N Maxwell, Rochester 11, N. Y.

AUTHORS' SERVICE

MAKE EXTRA money rewriting ideas in newspapers, magazines, books. May bring up to $5 per hour, spare time. Experience unnecessary. Write for Free details and how to get Free Writer's Market Guide! Comfort Writer's Service, Dept. I-K, 200 S. 7th, St. Louis, Mo.

I WANT New Writers to cash checks of $1 to $100 offered daily. The easiest way to write for pay. No previous experience necessary. Free Details. Saunders M. Cummings, 468-14 Independence Bldg., Colorado Springs, Colo.

SALESMEN WANTED

ADVERTISING BOOK matches—Cash in on big demand—sell Union Label matches. Cuts for all business and political parties—Free powerhouse selling kit—low prices—protection guaranteed on repeat orders—Cash commissions. Superior Match Co., Dept. F-151, 7530 Greenwood, Chicago.

SELL DUPONT Nylon Uniforms. Complete line famous exclusive Hoover Styled nylon uniforms for beauty shops, nurses, doctors, waitresses, others. Best quality, splendid values. Exceptional income. Real future. Equipment free. Write fully. Hoover, Dept. K-102, New York 11, N. Y.

NEW JOBS open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide, listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity, 28 E. Jackson, Dept. 19, Chicago 4, Ill.

BIG MONEY Taking Orders; Shirts, ties, sox, pants, jackets, sweaters, shoes, uniforms, etc. Sales equipment Free. Experience unnecessary. Nimrod, 4922-AR Lincoln, Chicago.

EXCEPTIONAL EARNINGS Selling Famous Bostonian shirts. Spare time, full time, sideline. Sales kit, actual fabrics, free. Bostonian, 89 Bickford, Dept. B-12, Boston 30, Mass.

SALESMEN—ABSOLUTELY make $50.00 a day. New sensational utility item for every food, beverage outlet, etc. Samples furnished. Utility Co., 53-MI West Jackson, Chicago 4.

FREE SAMPLE & information. Sensational new sports article. Nelson Company, Dept I, St. Paul 2, Minn.

BARGAINS

50,000 FULLFASHIONED NYLONS, Men's Socks 8c pair up. 1000 Doz. weekly. Send 25c for stock list & sample razor blades. Sibert Co., Chattanooga 4, Tenn.

5 PIECES. PEN, Pencil, Ballpoint, Knife, Flashlight w/keychain. $1.59. Weonit, 104 School, Fall River, Mass.

SEE OUR ad under motorscooters for Midget Car Bargains. Midget Motors Directory, Athens, Ohio.

PLAYER PIANO Rolls, Bought, Sold, Exchanged. Susie Ketchum, Box 1058-H, Springfield, Ill.

"POLICE JIU-JITSU, Scientific Boxing," $1.00! Free literature! Hirsch, Spring Valley 1, N. Y.

BUSINESS OPPORTUNITIES

BRUSH PLATING Outfits connect to a battery. No tanks necessary. Almost as simple as painting. Your opportunity to make good income plating, autoparts, bathroom fixtures, reflectors, mirrors. Get free proof and particulars that put you in a paying business of your own. Gunmetal Co., Ave. A, Decatur, Ill.

COIN MACHINES earn big money! Machines at $10.50 earn as high as $5.00 weekly profit. Place machines in stores, hotels, filling stations, etc., and your income starts immediately. Routes can be operated in spare or full time with no experience needed. We'll tell you how and send you a catalog describing our nut, candy, gum and postage vendors; also pinball machines, music boxes, etc. Write immediately to Parkway Machine Corporation, Dept. 15, 715 Ensor, St., Baltimore, 2, Md.

MAKE MONEY spare or full time, casting Metal Toys and Novelties. Big wholesale and chain store demand for cast Metal Autos, Soldiers, Ashtrays, Banks, etc., keeps manufacturers busy. Production moulds furnished for up to 100 and more castings per hour. No experience or special place necessary. Write for information and illustrations of patterns needed. Metal Cast Products Co., Dept. 2, 1696 Boston Road, New York 60, N. Y.

BIG MONEY. Spare or full time in your home. No selling! Spray New Miracle Finishes, Plush and Suede, on signs, radios, automobiles, figurines, lamps, toys, etc. Our business is booming. Help us fill huge demand. New easy Flok-Kraft methods. Material costs few pennies. You get dollars. Free samples. Complete powerful money-making plan free. Write now! Coast, 1004A S. Los Angeles St., Los Angeles 15.

BE INDEPENDENT, be secure, have your own profitable business—earn $20 and more a day making beautiful, fast-selling lamps at home. No equipment needed. Illustrated course teaches you quickly. Course, parts catalog, wholesale price list—only $2. Gearon Co., Dept. 200-CI, 27 S. Desplaines, Chicago 6, Ill.

JACK BE THRIFTY, JACK BE WISE, GIVE YOUR PAL A REAL SURPRISE.
See coupon on page 30

TRADE MAGAZINES help you to success. Get latest copies through our easy-to-get-acquainted service. More than 1200-business, professional, farming, investments, educational, sports, hobbies, music, radio, etc. List free. Commercial Engraving Publishing Co., 34W North Ritter, Indianapolis 19, Ind.

BRONZECRAFT BABY Shoe Mountings—All metal Bookends, Ash Trays, Picture Easels—Beautiful designs. America's lowest prices. Sample mounting $1.00 prepaid. Baby Shoe Electroplating instructions Free. Bronzecraft, 630 Newark Ave., Jersey City, N. J.

MAKE MONEY. Learn about new jobs, opportunities, latest data on 52 trades, professions. Know where, how to get information. New directory tells you. Moneyback guarantee. Send 50c. Raynor Company, Dept. 7, 60-B Court Drive, Wilmington, Del.

COLORGLAZED CONCRETE pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leaksealing. Money-making projects. Booklet, details free. Men only. National Pottery, Grand Rapids, Minnesota.

"YOU CAN actually see the metal flow on" with a portable Tyco Electro-Plater! Electroplate Metals, Mirrors, Leather, Glass, Wood, Plastics! Inexpensive, profitable home business. Free booklet. Tyco Metals, Box 13231-L, Houston 19, Texas.

MAKE MONEY At Home as renewal headquarters for all magazines. Big Christmas sales profits now. Liberal commissions. Supplies furnished. Write for Free Catalog. McGregor Magazine Agency, Dept. 520B, Mount Morris, Ill.

ACHIEVE BUSINESS and financial success in your own Collection-Credit Agency business. Home or office. Quickly learned. Free folder. Write Cole & Associates, Syracuse 2-MI, N. Y.

MAKE MONEY making new greaseless doughnuts at home with electric machine. Wholesale to grocers, drug stores, cafes, hamburger shops. Send for free recipes and plans. Irving Ray Company, 3605 South 15 Ave., Minneapolis 7, Minn.

FABULOUS EARNINGS—Fascinating pastime. Growing Genuine, living miniature (Ming) Trees. New sensational Business or Hobby. Astounding information Free. Dwarf Gardens, Box 355E, Briggs Station, Los Angeles 48, Calif.

A FACTORY in your home, garage! Mechanics' waterless hand cleaner, glass cleaner, auto cleaner-polish; many others. All formulas free, but if you also want free samples send 15c postage. Western Aircraft, Dept. H, Los Angeles 6.

NEW WAY to make $$$. Open your own Glasseal (Silicone) processing station. Big profit—small material cost—national publicity. We show you how. Free Details. Glasseal, 1002A So. Los Angeles St., Los Angeles 15.

START HOME Business. Free Booklet lists kits and materials. No course, no study, start right in earning. Each kit contains enough for practice and sale. Act Now! DonJer Products, 1115 Sterling Place, Brooklyn F, N. Y.

LEARN PIANO Tuning, Repairing—at home in 30 days. Unlimited Income. Phonograph recordings, tools and instructions furnished. Write Capitol City Tuning School, Dept. 145, 129 E. Michigan, Lansing 16, Mich.

LEARN SEWING Machine Repairing at home. Earn $125.00 week spare time. Plus new machines, motors, etc., wholesale. Free Particulars. Taylor Service Co., Dept. MI, Hamilton, Ohio.

$35. WEEKLY! HOME! Two hours daily! Invisible Reweaving! 27 other ways! Government assistance! No manufacturing, no canvassing! 25c. Walsh, 894 Main St., Buffalo (2), New York.

EARN WHILE building radios. Learn television. Experience unnecessary. Parts, tools, instructions supplied. Free details. Federal, 176-71 Union Turnpike, Flushing 6, New York.

EASY TO Make Expensive perfume with low cost "Essential Concentrate Base." Fast Tremendous Profits. Write Post Card. H. May, Box 4473-MD, Coral Gables, 34, Fla.

HOW TO Set Up And Run A Mirror Shop! Resilver Mirrors. Make Chipped Glass Nameplates. Electroplating Salts and Rectifiers. John Sprinkle V33, Marion, Ind.

BOOKKEEPERS EARN $100.00 week operating simplified "Bookkeeping & Tax Service." Information free. Universal Bookkeeping, Box 664-D, Springfield, Mo.

MAILING POSTCARDS selling repeat merchandise is profitable. Everything supplied. Details free. Gordin Publishers, Box 23, Pawtucket, R. I.

CASH FOR your idea, 280 manufacturers need inventions, patented or unpatented. List free. Invention Bureau, 208X Clinton, Oak Park, Ill.

NEW—DIFFERENT plan assures success in pleasant-profitable home operated mail business. Write: National, Box 88-M, Dorchester 22, Mass.

EARTHWORM BREEDING. Valuable bulletins on successful methods mailed free. Earthmaster Publications, Dept. 4, Sun Valley, Calif.

START OWN Business—home, office; booklet describing "137 Business Plans" free. Elite Co., 220-G Grand Street, New York 13, N. Y.

BOOKKEEPERS BOOST Income Operating Simplified Bookkeeping Service. Kern, 4942A Vineland Avenue, No. Hollywood, Calif.

SLOT MACHINES, Punchboards. Wholesale Catalog. Webb Distributing Co., 4964 West Chicago Ave., Chicago 51, Ill.

$250 WEEK REPORTED! Book "505 Odd Successful Businesses" free. Work home. Expect something Odd! Pacific-E, Oceanside, Calif.

EXTRA MONEY—No selling—operate vendors. Amazing profits, details Free. Silver King, Suite 280, 622 Diversey, Chicago 14.

BUY IT Wholesale! Manufacturers, distributors offer 850,000 items. Literature free. Olsen, 1231-C East Third St., Duluth 5, Minn.

START OWN profitable mailorder business. Copyrighted instructions tell how. Free folder. E. J. Lay, 3819 Kenmore, Chicago 13.

EARN BIG money at home, easy work, no investment, exciting details free. Harrison, 954-c Empire, Benton Harbor, Mich.

UNPAINTED FIGURINES. Beautiful models. Write for new wholesale price list. Oman, 642T Broadway, St. Paul 1, Minn.

MAKE FLEXIBLE Molds! Cast plaques, bookends, figurines! Free sample! H. Tooker, 630-E Chestnut, Hamilton, Ohio.

$100 WEEK BUSINESS and skilled trade at home. Details free. Cowan, 627 Prospect North, Grand Rapids, Mich.

$25 WEEKLY WORKING two hours daily. No canvassing. No manufacturing. Lycke, Box 2471-C, Cleveland 12, Ohio.

MANUFACTURE CLEANERS—Flavors—Cosmetics—Polishes. Formula Catalog Free. Kemico, Parkridge 60, Ill.

ALUMINUM PRODUCTS—Cast Letter Sample 25c. Z. & Z., 1143 Manhattan Ave., Brooklyn 22, N. Y.

MAKE PERFUMES At Home. Write, "Carey Laboratories," 1914 Chouteau MI-1, St. Louis 3, Mo.

TIN CANS. Turn them into cash. Nine methods. Instructions 50c. Charles, 12-BRH, Norwood, Ohio.

UNPAINTED NOVELTIES. Good Designs. List free. Novelty Products, 146 Railroad St., Tiffin, Ohio.

$124.50 WEEKLY GUARANTEED. At Home. Sparetime. Science Syndicate, San Antonio, Texas.

$46 FROM SQUARE Foot Plywood. Jigsaw necessary. Write, Woodarts, X-57, Bridgewater, Mass.

$4,000.00 PROFIT IN two months. No investment. Details 50c. Charles 12-BRK, Norwood, Ohio.

SAWDUST. TURN it into cash. Six methods. Instructions 25c. Charles, 12-BRM, Norwood, Ohio.

HEAT YOUR Home, Garage—Absolutely Free. Details 25c. Bolinder's, South Salt Lake, Utah.

SELL BY Mail; Free Booklet, Instructions. Manhattan House, PO Box 50-X, New York 28, N. Y.

MAKE PERFUME—Men-Women. Write "International," 6347 Parnell-MI-1, Chicago 21, Ill.

BE YOUR Own Boss. Metallize Baby Shoes. Your Business. Schwieger, Coloma 5, Wis.

MAKE MONEY addressing envelopes at home like I do. Evans, Box 2674, Lakewood, Ohio.

RECAST OLD batteries into new. Latest Achievements. Battery Laboratories, Minneapolis.

HOW AND where to obtain Capital? Free details. Star Service, Wapakoneta, Ohio.

BE APPOINTED State Notary Public now! Details. Stationers, Helotes 50, Texas.

BUSINESS SERVICE

SUCCESS SIMPLIFIED! Become a financial wizard; a mental giant; a muscular Superman; a romantic magnet; an expert in any field! Free literature. National Advisory, Box 5852, Cleveland 1, Ohio.

WHERE TO Buy Almost Anything. Supply sources furnished. Single item 25c, 5 for $1.00. Matthews, Box 649, Indianapolis (6) Ind.

CANDYMAKING

MEN—WOMEN—"Everybody Likes Candy." Learn to make professionally. (Our 40th year.) Ragsdale Candies, D3 East Orange, N. J.

CARTOONING, SIGNPAINTING, DRAWING AIDS

CARTOON YOUR Way To Success! Internationally known instructor, Raye Burns, will personally teach you to create salable, original cartoons at home. Course of 26 lessons only $2.85. Send remittance with order or write for Free Details and addresses of successful students. Raye Burns School, Box 3583-F, Cleveland 18, Ohio.

"HOW TO Make Money With Simple Cartoons"—a book everyone who likes to draw should have. It is free; no obligation. Simply address Cartoonists Exchange, Dept. 351C, Pleasant Hill, Ohio.

SHOWCARD WRITING Pays Big! Learn rapid, artistic lettering quickly, easily. Our low-cost course shows how. Details free. J. Sherwood, Box 8, Irvington 11, N. J.

EARN MONEY Evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle (3-B), Wis.

SIGN PAINTING taught at home. Test lesson free. Ben Kerns, Box 812, M. Greenville, S. C.

FREE. OK'D Rough. No obligation. Rush postal. Cartoonist, La Habra, Calif.

CHEMICALS & SUPPLIES

LABORATORY APPARATUS, Chemicals, Microscopes, Complete Chemistry Sets, Minerals, Uranium Ore. 10c brings catalog. Porter Chemical Company, Hagerstown 3, Md.

URANIUM ORE sample, weighing scale, catalog of chemicals, apparatus, kits, $1.00. Catalog only, 10c. Rex Laboratories, 2849-C Birchwood, Chicago 45, Ill.

SAVE ON chemicals, supplies. Catalog 10c. Laboratory Sales, P. O. Box 161, Brighton, Mass.

EDUCATION & INSTRUCTION

PIANO TUNING pays. Learn this profitable profession at home. Our Tonometer and mechanical aids make learning easy. No knowledge music necessary. Diploma granted. Largest and oldest school—53rd year. G.I. approved. Write for booklet. Niles Bryant School, 87 Bryant Bldg., Washington 16, D. C.

IT'S FUN learning a Language by Linguaphone. At home, in leisure time, quickly, easily, correctly master Spanish, French, German—any one of 29 languages through proved Linguaphone conversational method. Send for free book. Linguaphone Institute, 145-01 Rockefeller Plaza, N. Y. C.

U. S. GOV'T Jobs! Start high as $66.34 week. Men-Women. Qualify Now. Thousands of openings despite economy efforts. Experience usually unnecessary. Free 40-page book shows jobs, salaries, sample tests. Write: Franklin Institute, Dept. M-28, Rochester, New York.

BOOKKEEPERS! Increase your earnings! Operate your own simplified "Dollar-A-Week" Bookkeeping and Tax Service. Full or spare time. Details Free. No obligation. Ellis, Box 202, Cedar Grove, N. C.

SHOE REPAIR offers big income. Learned by doing; ages 18-60. Free illustrated book tells how. Write Modern Shoe Rebuilding School, C-806 S. Figueroa, Los Angeles.

MEDICAL LABORATORY Technicians in great demand. We train you in your own home. Catalogue free. Imperial Technical Institute, Box 973-A, Austin 65, Tex.

USED CORRESPONDENCE Courses And Books sold and rented. Money back guarantee. Catalog Free. (Courses bought.) Lee Mountain, Pisgah, Ala.

STUDY FOR game warden, fish, park, forestry, patrol and wildlife conservation service. Details free. Write Delmar Institute, C-9 Denver, Colo.

MAKE UP to $35-$45 Week as a Trained Practical Nurse! Learn quickly at home. Booklet free. Chicago School of Nursing, Dept. M-12, Chicago.

USEFUL "DICTIONARY Of Electrical Symbols And Formulas." 25c. Michigan Technical Institute, 2281 W. Fort Street, Detroit 16, Mich.

DEGREES: HOME Study. Catalogue: Sciences, Philosophy, Psychology. "Esoteric School Sciences," Chesterfield, Ind.

HOME STUDY course, drugless therapy, Free Literature. Inst. of Drugless Therapy, Tama, Iowa.

FORMULAS & PLANS

CONCENTRATED VEGETABLES. Highest grade, raw, dehydrated, in tablet and powder form. No drugs. Write today for free circular. Kiro Concentrated Foods, Tama, Iowa.

FORMULAS, TRADE secrets, for nearly everything. Catalog free. Creative Publishers, Winnetka 8, Ill.

REAL MANUFACTURING formulas. Lists free. W. Cummings, Chemist, Gordon Ave., Syracuse, N. Y.

LABORATORY TESTED Formulas. Lists Free. Pont Chemical Company, Terre Haute 3, Ind.

PENMANSHIP, HANDWRITING ANALYSIS

PENMANSHIP CORRECTOR — Improves your Penmanship in 3 hours. Free Proof. Inventor "Oz," Box 665 (36a), St. Louis, Mo.

MAILING LISTS

SPECIAL:—1000 OPPORTUNITY Seekers names, $1.00. Wilbur Errickson, Englishtown, N. J.

MALE HELP

FOREIGN EMPLOYMENT. Construction men, building trades, mechanics, helpers, office men. Good workers interested in Foreign Development Projects. Pipe lines, Dams, Power plants, Roadways, Shipping, Oil refineries, etc. Transportation and quarters furnished: High wages. Listings of firms actively working on projects in Arabia, Persian Gulf, Africa, Alaska, Canada, South America, Europe, etc. Send $1.00 for Foreign Construction Compendium and Application forms, Foreign Service Bureau, Dept. MI-1. 12 (Employment) P. O. Box 295, Metuchen, N. J.

ALASKA—AMERICA'S Frontier. $1.00 brings 1951 Business Directory, Large Government Map giving Up-To-Date Construction Projects, Current employment information, Homestead & Highway facts, Hunting-Fishing-Game Rules, Firms hiring & application forms. Alaska Opportunist, P. O. Box 883-MI, Hollywood 28, Calif.

FOREIGN & LATIN American Employment. 1951 "Foreign Service Directory" gives Up-To-Minute Facts on Military & Civilian Construction, Government Jobs, Major Oil Listings, Aviation, Transportation, Steamship Lines, Mining, Importers, Exporters, How-When-Where to apply, application forms, Hot List Firms Hiring. $1.00 postpaid. Global Reports, P. O. Box 883-MI, Hollywood 28, Calif.

classified section

CONSTRUCTION WORKERS! Where is your next job going to be? Learn where the big jobs are. Pick the best. Send one dollar for our latest up to date report. Dempster's Construction Scout News, Box 268-AA, Bridgeport, Ill.

$5 HOUR EASY! Sell name plates for houses. Free Sample, order blanks. Write: National, 214 Summer, Boston, Mass.

MONEYMAKING OPPORTUNITIES

START YOUR Own Business on credit. Always your own boss. 1559 Dealers sold $5,000 to $28,000 in 1949; their average $6,834. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant profitable business backed by world-wide industry. Write Rawleigh's, Dept. A-U-MOM, Freeport, Ill.

SCHOOL SENIORS—Sell Classmates America's most beautiful Graduation Name Cards. Largest Selection. Highest commission. Outsells all others. Free Sample Kit. Printcraft, Dept. 1, 1425 E. Elm St., Scranton 5, Penna.

VENDING MACHINES—No selling required. Send for Free 32-page illustrated catalog describing our numerous coin machines; also showing you how you can earn Amazing Profits either full or spare time. Parkway Machine Corporation, Dept. # 5, 715 Ensor St., Baltimore 2, Md.

IS $210. A week worth a penny postcard to you? Then rush card with name and address for special Free Trial Plan that sells amazing new Automatic Refrigerator Defroster "like hot cakes!" Write to Mr. Lewis, D-Frost-O-Matic Corp., Dept. MIC-1, 6 N. Michigan, Chicago 2, Ill.

RESURFACE MEAT Blocks with our fast portable machine. Unique service in great demand. Surprising profits for full or part time work. Hill Machine Company, Dept. L, 1032 Mulberry St., Rockford, Ill.

A $100-A-MONTH hobby at home! No soliciting, no mail order, no meeting people. Easy, enjoyable pastime. Details, 25c. (Refundable). Laura Dickson, 1006-M. I., Elizabeth St., Anderson, S. C.

ELITE COLLECTION. New edition, contains 137 practical Money-Making Plans; local and mail order. Particulars free. Elite Co., 220-G Grand St., New York 13, N. Y.

OPERATE PROFITABLE Mail Order Business! Splendid opportunity! For details, write: R. Schaal, 176-52 Sunbury Road, Springfield Gardens 13, N. Y.

EARN MONEY At Home. Work mornings, afternoons free. Big income possible. Details free. Chambers Enterprises, Box 871, Augusta 9, Ga.

DETECTIVES EARN Big Money. Experience unnecessary. Detective Particulars free. Write, George Wagoner, 125-J West 86th, New York 24.

PRIZE CONTEST Opportunities! Get Wise to Winning a Prize! Send stamp. National Contest Bulletin, Box 2685-R, Miami 16, Fla.

$250 WEEK REPORTED! Book "505 Odd Successful Businesses" free. Work home. Expect something Odd! Pacific-E, Oceanside, Calif.

$5 HOUR EASY! Sell name plates for houses. Free Sample, order blanks. Write: National, 214 Summer, Boston, Mass.

FREE LITERATURE—Thousands Wholesale supply sources. Moneymaking Business ideas. Wilkin Company, Hillsboro 5, Ohio.

EARN MONEY Evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle (3), Wis.

LAKE SKIFF PLANS

A light and sturdy 12 ft. skiff whose simple design and construction make her an ideal "first boat" for the amateur builder. Because of the plywood planking, the skiff is permanently leakproof and can be stored out of the water without opening any seams. Plans show step-by-step assembly; include material list. Plan No. 923, price $1.50. Send order and remittance to: Mechanix Illustrated Plans Service, Fawcett Building, Greenwich, Connecticut.

RAISE YOUR business value, standing, as State Notary Public. Information. Stationers, Helotes 50, Texas.

MADE BIG Money! So Can You! Wamsteker, Box 34-D, Wynberg, Cape, South Africa.

OFFICE SUPPLIES & EQUIPMENT

TYPEWRITERS $25.00, DUPLICATOR $12.50, Adders $12.95, Addressers $9.95. Typewritery, 118N Spruce, Wichita, Kan.

POULTRY

POULTRY FARMERS—Broiler Growers—Turkey Raisers read the new American Poultry Journal for latest ideas and greater profits. 12 months, 50c. Special offer, 4 years, $1.00. American Poultry Journal, 569 South Clark, Chicago.

RAISE TURKEYS the new way. Write for free information explaining how to make up to $3,000 in your own backyard. Address National Turkey Institute, Dept. 44, Columbus, Kan.

PROFITABLE OCCUPATIONS

TURN YOUR spare time into cash. Make quick-selling, highly profitable lamps—every home a prospect. No experience or special tools required. New 1950 56-page illustrated catalog shows shades, shade frames, figurines and bases, oil lamp converters, boring compounds, and dozens of similar items. Also all kinds of sockets, cords, pipes, harps, finials, bases, and hundreds of other parts—everything you need. Special 8-page section shows 6 beautiful lamps in kit form ready to assemble. You buy wholesale, sell at retail—make big profits. Hundreds doing it. You can, too. Send 25c today for catalog and wholesale price list. Refundable first order. Gearon Co., Dept. 500-C1, 27 S. Desplaines, Chicago 6, Ill.

YOUR OWN profitable home business. Preserve live flowers to last forever. New simple discovery. Enormous demand all year 'round. Tremendous profits! Light fascinating work. Send $2.00 for working equipment, instructions, and valuable sales plans. Satisfaction guaranteed or money promptly refunded. Alfred Hermansen, 210 Fifth Ave., Suite 1102B, New York 10, N. Y.

WANT A Diesel Job? Our approved, up-to-the-minute Diesel Training Program can help you qualify for steady, big pay jobs or specialized military training. Covers Diesel, Tractor, Heavy Equipment. Easy to master. No loss of present income. Job Placement Advisory Service. Investigate! Write for information today. Interstate Training Service, Dept. 4A, Portland 13, Ore.

FREE BOOK "How To Make Money With Home Workshop" describes amazing methods used by hundreds of successful craftsmen. Tells what to make, how to sell workshop output spare time. Write at once for details. Remember it's free! Craftsman, 115C-11 Worth St., New York City.

ANNOUNCING HOME study course in commercial baking. Practical basic training. Good field for those with aptitude. Nearly depression proof. Send for Free booklet, "Opportunities in the Baking Industry." National Baking School, 1315 Michigan Ave., Dept. 2042, Chicago 5, Ill.

HAVE FUN! Make Money! "Working with Leather"—64-page booklet tells how. Send 25c for copy. Free catalog and valuable information included. Wilder-Craft, 1037 Crosby, Chicago 10.

LEARN ARC welding at low cost in non-profit school. Easy to learn in short time. V-A contract. Write for free book. Hobart Trade School, Box SM-112, Troy, Ohio.

JIGSAW OWNERS Attention! Start earning money at home cutting out wooden novelties and souvenirs. Write H. Cook, Dept. 8, 4407 S. Normal Ave., Chicago 9, Ill.

PROFITABLE HOME Business. Make fast-selling Easter, Mother's Day flowers, monkey trees, dolls. Literature free. Velva, Dept. V, Bohemia, N. Y.

$40.00 WEEKLY, MADE growing mushrooms, Fresh, Dried, Dominion Patent 331583. Free Spawn. North American, 169M Yonge, Toronto, Canada.

PROFITS GALORE, Get Your Share Raising Fishworms At Home. Send 50c for complete information. Ohio Bait Co., Box 126, Cincinnati 14, O.

RAISE FISHWORMS, Easy, Profitable. Send 25c in coin for complete instructions. Huffmans Worm Ranch, Rives Junction 3, Mich.

DETECTIVES—MAKE Secret Investigations. Interesting occupation. Write, George Wagoner, 125-J West 86th, New York 24.

$5 HOUR EASY! Sell name plates for houses. Free Sample, order blanks. Write: National, 214 Summer, Boston, Mass.

$5000 FROM HALF acre growing Ginseng, crop bought, Particulars 10c. Associated Growers, Sperling, Manitoba.

EARN UP To $400 Monthly Raising Rabbits. Free Particulars. White's Rabbitry, Newark 57, Ohio.

LIFETIME INCOME as Notary Public. Appointment assistance. Stationers, Helotes 50, Texas.

$200 WEEKLY REPORTED! No selling. Free booklet. T. J. Surface, Roanoke 4, Va.

RADIO, TELEVISION, SUPPLIES & INSTRUCTION

FREE! 212 PAGE Radio and Television Catalog! World's largest stocks, lowest prices. Complete supplies for builders, experimenters, amateurs, servicemen. Latest radios, phonos, television, recorders, sound equipment. Thousands of parts, tubes, test instruments, books, diagrams. Top quality money saving values. Get it now! Allied Radio Corp., 833 W. Jackson Blvd., Dept. 45-A-1, Chicago 7, Ill.

EARN WHILE building radios. Learn television. Experience unnecessary. Parts, tools, instructions supplied. Free details. Federal, 176-71 Union Turnpike, Flushing 5, New York.

WAKE UP to music! Build your own Radio-Clock Combination. Send $1.00 for detail instructions and necessary changeover parts. McCain Electric Service, Urbana, Mo.

MAKE SIMPLE, Tubeless, Batteryless, Distance-Getting Crystal Radios. Crystal and illustrated instructions 25c postpaid. Allen 427-M, Clinton, Mo.

15 TESTED ONE-TUBE circuits 25c including "Radiobuilder," catalog. Laboratories, 578-K, San Carlos, Calif.

TUTORING RADIO, Television, Electronics. $5. Motech, 3907 N. 25th, St. Louis 7, Mo.

TREASURE FINDER

TREASURE-MINERAL LOCATORS—Geiger Counters, extra light weight, ultra-sensitive, lowest cost, credit purchase plan available, factory guaranteed free illustrated literature. Fisher Research Laboratory, Inc., Palo Alto, Calif.

TREASURE FINDERS for gold, silver and minerals. Money back guarantee, best available. Also Geiger counters for uranium prospectors, free information. Write Goldak Company, 1546 West Glenoaks, Glendale 1, Calif.

SEEK GOLD, Uranium, Buried Treasure! Latest low cost super-sensitive equipment. Free literature. Glen Scientific, Box 151-F, Glen Ellyn, Ill.

PRINTING, MULTIGRAPHING, MIMEOGRAPHING, ETC.

ENAMELED BLOTTER Business Cards, 200—$1.00; 1000—$4.50. Name-address Stickers, 250—25c. 3"x6" Circulars, 2000—$3.00; 6"x9" 2000—$7.00. Acmeprint-7, Hendersonville (5), N. C.

BUSINESS PRINTING. Samples, prices free. Howprint, 723-D Eunice, Webster Groves 19, Mo.

LETTERHEADS, ENVELOPES, cards, samples, 2c stamp. Walter Narlock, Gaylord, Mich.

PRINTING OUTFITS & SUPPLIES

PRINT YOUR own cards, stationery, circulars, advertising. Save money. Simple rules. Print for others, nice profit. Raised printing like engraving too. Have home shop. Details free. Kelsey Presses, L-57, Meriden, Conn.

MAKE YOUR Own rubber printing cuts. Self-molding process. Plexirubber, Argyle (3), Wis.

PRINTING MACHINERY. Type Supplies. Lists 3c. Turnbaugh Service, Loysville, Penna.

RUBBER STAMPS & MARKING DEVICES

READY MADE stock stamps. Big list. Criterion Stamps, P.O. Box 2326, Denver 26, Colo.

TYPEWRITERS, DUPLICATORS, OFFICE DEVICES

PRINTOMATIC SELFFEEDING Post Card printing Duplicator $13.50. Envelope Addressing Machines $24.50. Pittsburgh Typewriter Company, 336-D Fourth Avenue, Pittsburgh 22, Pa.

AMAZING POSTCARD Duplicator. Only $2.00 Complete. Guaranteed. Up to 200 copies from Pencil or Typewriter. Cardco, 1604 Race, Cincinnati 10, Ohio.

RARE COINS

FREE! FOREIGN Coin, banknote and Coin Colectors Illustrated Catalog to approval service applicants. Send 3c postage. Tatham Coinco, Springfield 9, Mass.

COMMEMORATIVE $½—WASHINGTON, Stone Mountain, Columbian, $1.50 each. Illustrated Catalogue, 25c. Shultz, Salt Lake 9, Utah.

STAMP COLLECTING

COLUMBIANS, TRANS-MISSISSIPPI, Pan Americans, Pan Pacific, ten other different commemoratives. All 10c with your request for U. S. approvals. Moda Stamps, Box 251, C.S.A., New York 8.

POSITIVELY GREATEST Free Offer! Latest Scott's International $6.00 stamp album—covering entire world, contains 36,000 illustrated descriptive spaces; Scott's 1950 Standard $7.00 catalogues "Philately's Encyclopedia" — absolutely Free to applicants for foreign approvals becoming customers. Approval Service, P. O. Box 1700, San Francisco, California.

FREE—FAMOUS Americans Set, plus Flag Set, plus the National Parks set, plus the Presidential Set to the $5. A total of 90 stamps absolutely Free to customers for our unsurpassed United States or Foreign selections. Send 3c postage for 15 of the above mentioned stamps and full particulars. Triboro Stamp Company, 145 Nassau Street, Dept. 301, New York.

FREE ALBUMS, catalogues, stamps, etc., to our customers. Ask for details and selection of approvals. Prices, stamps, and service that satisfy mounted in books and sheets—priced from 1/10 to ½ catalogue. References appreciated. Roseland Stamp Co., Dept. 8, Spring Lake, Mich.

FREE COLLECTION—Over 100 different stamps of the world—commemoratives, camels, giraffes, ships, she-wolf, rare Austria race horse, others all to approval buyers; also Scott International Albums, Stamp Catalogs. Bell Stamp Service, Dept. C-2, Box 190, Bell, Calif.

FREE—RARE Stamps From Mysterious Nepal, Plus Octagonal (Eight Sided Stamp), Giant Triangle, Gorgeous Diamond, Mammoth, Midget Stamps, Value Exceeds $2.00. All Free To Approval Buyers. Stamps, Box 58, Santa Ana, Calif.

ZANZIBAR, PITCAIRN Islands, Turks, Caicos, Gilbert, Ellice, Solomon, Leeward, Gambia, Tanganyika and others. Complete collection free. Send 5c for postage. Gray Stamp Company, Dept. MM, Toronto 5, Can.

WIFIE, IF YOU'D LIKE A BUSS FROM YOUR EVER-LOVING GUS
See coupon on page 30

500 STAMPS FOR Only 10c! This mammoth value includes Airmails, Pictorials; stamps from strange Countries cataloguing up to 25c each! Also approvals. Mystic Stamp Company, Camden 30, New York.

SAN MARINO Collection Free—25 different, Old and New Issues, Airmails, Commemoratives, High Values — absolutely free with approvals, Viking, 130-MM Clinton St., Brooklyn, N. Y.

FRIENDLY NEEDED information any questions answered. U. S. complete illustrated pricelist. Write Sophus Jenssen, Coupeville, Washington, on beautiful Whidbey Island.

LOOKING FOR Bargains? Try our 1 & 2c approvals mounted in books of 1,000. We believe in both quantity and quality. First try will satisfy. Clark, Box 544-N, Muskegon, Mich.

FIRST U. S. (1847) Government Reissues 5c, 10c, plus Giant Bargain U. S. Collection—only 5c to applicants U. S. approvals. Metropolitan, Box 312H, Jackson Heights, N. Y.

19TH CENTURY U. S. stamps nearly 100 years old; Roosevelt set, others, only 5c to applicants U. S. approvals. Wakonda, 272L, Jackson Heights, New York.

FREE! CANADIAN sets, Royal Visit, George VI, George V, Coronation, Jubilee, others, to approval applicants. Ensign, Box 118-X, South Orange, N. J.

WORLD'S LARGEST Stamp (7½x14 inches). A real curiosity! Retails for 50c, only 3c to approval applicants. Tatham Stamp Co., Springfield 9, Mass.

DIAMOND, PIGMY, Jumbo, other queer stamps—Free with bargain-packed, excitingly "different" approvals. Niagara Stamps, Niagara-on-the-Lake 15, Can.

WOW! 203 ALL Different Germany 10c! Zeppelins, Semipostals, Airmails, High Values, etc., to new customers. Jamestown Stamp, Jamestown 515, N. Y.

FREE! 100 WORLDWIDE different stamps to approval buyers. Big U. S. and illustrated bargain lists sent with approvals. Bookman, Maplewood 3, N. J.

TWENTY-FIVE DIFFERENT Stamps From Great Britain Sent For 5c To Approval Applicants. Donald Brunner, 832-A Union Street, Lancaster, Penna.

307 ALL DIFFERENT—Only 15c! Beautiful collection: Commemoratives, Triangles, High Values, Bicolored Stamps, etc. Garcelon, Calais 475, Maine.

HAVE FUN. Add thousands of stamps to your collection at 1c each. Write for Economy 1c approvals. Joe Goldman (MX) Lynbrook, N. Y.

FREE "STAMP Finder." Tells instantly country to which any stamp belongs. 32 pages profusely illustrated. Garcelon, Calais 10, Maine.

FREE. SCOTT'S International Album. Other big premiums. Full particulars with approvals. Raymax, 123-K William St., N. Y. C. 7.

COMPLETE ROOSEVELT Set, other commemoratives 5c with United States approvals. Locust Stamp Co., Box 390M, Peekskill, N. Y.

OLD SCARCE U. S. Seconds On Approval. Slight imperfections, lowest prices. Hernfelder, Clintonhill Sta., Newark 8, N. J.

PAY LESS, Get More—Write For Our 1c, 2c, 3c Approvals. Get The Best For Less. Thrifty Stamps, Morongo Valley, Calif.

200 DIFFERENT, INCLUDING Roosevelt triangle. 5c to approval applicants. K. Avalon Stamp Co., Springfield, Mass.

40 DIFFERENT U. S. Mostly commemoratives 10c approvals. Royce Menerey, 3321 N. Cramer, Milwaukee 11, Wis.

200 BRITISH EMPIRE Stamps plus valuable publications. Only 3c. Kenmore Stamps, Arlington 74-B19, Mass.

BAHAWALPUR SET 10c. Profit-sharing approvals. Rheaume, 6591 11th Avenue, Montreal 36, Que., Can.

"HOW TO Recognize Rare Stamps." Free Book-Illustrated! Kenmore, Arlington 74-H10, Mass.

100 DIFFERENT — COMMEMORATIVES, airmails, triangles, diamonds, 10c. Kostillo, Bellaire, Ohio.

ZOUNDS! AMAZING "Queer Countries" Packet—Free with approvals! Saxon, Escondido, Calif.

FREE PACKET with introductory approvals. Luther Chick, 436 No. Main, Brewer, Maine.

FREE—WORLD'S Only Giant "Cardboard" Triangle. Approvals. Beaman, Leeds 8, Ala.

MONACO NUDES Set—10c. Approvals accompany. Atlas, 3210-N Republic, Racine, Wis.

HYGRADE U. S. approvals priced to please. Weenigman, 1933 Patterson, Chicago 13.

FREE PHILATELIC Price List. Penny Approvals on request. Read, Box 980, Chicago 90, Ill.

25 "FRENCH COLONIES" Pictorials 3c with approvals. Belmont, Washington 15, D. C.

750 FRANCE AND Colonies stamps 10c. Littleton Stamp Co., Littleton 27, N. H.

50 DIFFERENT U. S. 10c. No approvals. Seidenberg, Box 944, Appelton, Wis.

½c—1c APPROVALS! 12,000 BARGAINS! Cole, 43-J Rinewalt, Buffalo 21, N. Y.

100 EXOTIC JAPAN—All different—10c. Kenmore, Arlington 74-K9, Mass.

FREE-ILLUSTRATED CATALOG. Kenmore Stamps, 74-C9, Arlington, Mass.

50 FREE STAMPS with approvals. Lake Stamp Co., Ballston Lake, N. Y.

classified section

STAMPS WANTED

! WILL Pay $100.00 each for 1924 1c green Franklin stamps, rotary perforated eleven (up to $1,000 each unused). Send 10c for large illustrated folders showing Amazing prices paid for old stamps, coins, and collections. Vernon Baker, MI-3, Elyria, Ohio.

CHALK TALKS

TRICK CHALK Stunts. Catalog 10c. Cartoonist John Balda, Oshkosh, Wis.

DETECTIVES

DETECTIVES—WORK Home—Travel. Experience unnecessary. Detective Particulars free. Write, George Wagoner, J-125 West 86th, New York 24.

DETECTIVE TRAINING. Phillips Secret Service System, 1917-G North Kenneth, Chicago 39, Ill.

GAMES—ENTERTAINMENT

HOME SLOT Machines, Punchboards, Games. Webb Novelties, 4964 West Chicago Ave., Chicago 51, Ill.

HYPNOTISM

STUDY HYPNOTISM! Amazing illustrated lessons. Simple understandable language. This course tells how practical hypnotism is performed: over telephone, on stage, conquering timidity, dominating others. Full price only $2.95, postpaid; or C.O.D. plus postage. Satisfaction or refund. Order "Hypnotism Course" today. Nelson Company, 210 S. Clinton, Dept. 2A-3, Chicago 6.

"YOU CAN Hypnotize. Yes, Anyone. Mystify Friends. Instructions Given Exactly What To Do And Say. Amazing Techniques. Selfhypnosis Fully Explained. Send For Startling Book, "Hypnotism Revealed."........$1. Twelve Inch Phonograph Record Inducing Selfhypnosis, Grouphypnotism........$5. Melvin Powers, Professional Hypnotist, 1324 Wilshire, Hollywood 17D, California.

HYPNOTISM CAN Help You! Would you like to become ten times the man or woman you are now? Send today for course in Hypnotism, $1.50. William Lewis, 4009 Lake Park, Box 413, Chicago, Ill.

HYPNOTISM, SAMPLE Lesson Free. Write Baltimore School of Hypnotism, Dept. 101B, 4214 Belmar Avenue, Baltimore 6, Md.

MAGIC TRICKS, JOKERS, PUZZLES

500 TRICKS, NEW 1950 edition now ready! Send only 10c for your copy, containing latest in good magic for pocket, parlor, stage. Unequalled service to magicians for 30 years. Douglas Magicland, Dept. 3, Dallas, Texas.

584 PAGE CATALOG, 7500 Novelties, Jewelry, funmakers, gadgets, hobbies, sports, tricks, jokes, timesavers, radios, animals, music, guns, etc. 10c. Johnson Smith Company, Dept. 315, Detroit 7, Mich.

512-PAGE CATALOGUE of 2500 tricks, pocket, parlor, stage. World's Finest Magic. Send $1.50 for catalogue (refunded first $6.00 order). Kanter's, R-1311 Walnut, Philadelphia 7.

FREE JOKERS' Item with Giant Catalog, Tricks—Jokes—Puzzles—10c. Anderson's Fair, 6815-R Ardmore, Chicago 31.

BE A Magician. Large professional magic catalog of latest tricks, 35c. Ireland, 107 North Dearborn, Chicago 2.

WE SUPPLY every noted magician. Large Professional catalog 50c. Holden, 220 West 42nd St., New York.

16 WORLD'S BEST card tricks and catalog 25c. Sterling Magic, Royal Oak, Mich.

ESCAPE FROM Any Handcuff. Sensational Secrets. Twenty-year professional. Book, $1.00. Martully, 86 Akron, Westmont 2, N. J.

FREE TRICK And Catalog 25c. Lerro's Magic, 509 80th Street, Brooklyn, N. Y.

MUSIC INSTRUMENTS & INSTRUCTION

POEMS WANTED for musical setting. Send poems for free examination. Five Star Music Masters, 629 Beacon Bldg., Boston, Mass.

SONG POEMS wanted to be set to music. Send poems. McNeil, Master of Music, 510 MI South Alexandria, Los Angeles, Calif.

POEMS WANTED. Broadcast consideration. Sooner Song Co., 22-Northwest 8th, Oklahoma City 2.

TATTOOING SUPPLIES

TATTOOING OUTFITS. Supplies. Illustrated list Free. Zeis, 728 Leslie, Rockford, Ill.

VENTRILOQUISM

LEARN VENTRILOQUISM. 3c stamp brings particulars. Smith, Dept. 250, 801 Bigelow, Peoria 5, Ill.

BOOKS, PERIODICALS, PICTURES, POSTCARDS

MAGAZINES (BACK Dated) — Foreign, Domestic, arts. Books, booklets, subscriptions, pin-ups, etc. Catalog 10c (refunded). Cicerone's, 86-22 Northern Blvd., Jackson Heights, N. Y.

BOOKHUNTERS! ALL Subjects. Send Wants! Jaher Book Service, 620-M East 178 Street, New York 57.

35MM ENLARGER

An MI project of especial interest to the minifan. This particular enlarger was built around a Leica though any other miniature can be used just as well. The drawings show very plainly all the parts needed to make this versatile little job. It features an arrangement that permits the film to be advanced without any chance of your favorite negatives being scratched as the condenser is lifted out of the way to advance the film. When lowered, the weight of the condenser serves to keep the film perfectly flat and in the focal plane. Blueprints and descriptive text are available from the MI Reader Plan Service, Fawcett Building, Greenwich, Conn., for 50c. Ask for Plan No. P-4.

STRANGE STORIES! Sample and illustrated literature, 25c. Stone, Lunenburg 23, Mass.

CAMERAS, EQUIPMENT & PHOTO SUPPLIES

ENLARGER: FIFTY cents will buy the complete plans and instructions for the building of MI's Parallel Arm Enlarger. It has been especially designed to accommodate all cameras from a 35mm Argus to a 4x5 Speed Graphic. Your own camera and lens form the optical and focusing system. This enlarger has been built by dozens of enthusiastic amateur photographers. Send your remittance and request to Fawcett Publications, Inc., Greenwich, Conn. Ask for Plan No. P-2A.

35MM ENLARGER. Large-size plans for the construction of an enlarger expressly designed to be used with miniature negatives are now available for readers of MI. This enlarger uses a single condenser which also serves to hold the negative absolutely flat in the focal plane. For the easy-to-follow drawing, send 50 cents to the MI Reader Plan Service. Fawcett Publications, Inc., Greenwich, Conn. Ask for Plan No. P-4A.

CONTACT PRINTER. Plans and instructions to build MI's famous contact printer now available. Will take all negatives up to and including 4x5 in. as well as postcard size. The easy-to-follow drawings can be used as full-size templates if desired. Send 50c to Fawcett Publications, Inc., Greenwich, Conn., and ask for Feature Plan No. P-1.

BASS SAYS: Trading cameras a national habit since 1910. Write to Bass the old "Horse Trader." A postcard will do. Simply say: "Bass, I have and I want . . . How much will you allow me?" It's fun to trade with Bass. Satisfaction guaranteed. Bass buys, sells, and trades. Bass Camera Company, Dept. MI, 179 W. Madison St., Chicago 2.

PHOTOGRAPHY FOR pleasure or profit. Learn at home. Practical basic training. Long established school. Write for free booklet. American School of Photography, 1315 Michigan, Dept. 2041, Chicago 5.

HOME MOVIES

EXCITING MOVIES (8-16mm.), Enormous Selection. Cameras, accessories, bargains, surprises galore! Big illustrated Catalog. 25c; refunded first order. National Film Supply, Toledo 9-K, Ohio.

GUARANTEED FRESH 8mm roll, magazine; 16mm roll, magazine movie films. Color, b&w. Free catalog, ESO-S, 47th Holly, Kansas City 2, Mo.

MOTION PICTURES & SOUND EQUIPMENT

WORLD'S BIGGEST stock of used 16mm. sound film bargains—over 200,000 prints on hand! Hundreds of good feature pictures, $39.95 up. Cartoons, $5.95; one reel sports, $7.95; travels, musicals, $9.95; two reel comedies, $17.95; 100' Panoram musicals low as $9.95 a dozen. New one reel, discontinued Castle, Pictorial cartoons, musicals, travels, $7.95, $9.95. Write for free catalog 4-J. Blackhawk Films, Davenport, Iowa.

WILD ANIMAL films, 16mm, 8mm. Natural color, black-white. Sound, silent. Complete life stories, thrilling closeups, taken by famed Eberhart organization. $1.75 and up. Send for free illustrated catalog. Wild Life Films, Dept. 1-MI, 6063 Sunset Blvd., Hollywood, Calif.

8-16MM SILENT-SOUND Films. Complete rental library. All latest subjects. Free catalogue, (sample film 10c). Garden Film, 317 West 50th, New York 19.

1000' 16MM. SILENT—Sound film $7.50. International, 2120 Strauss, Brooklyn 12, N. Y.

"CINE-VOICE" SOUND-ON-FILM Camera shoots your own 16mm Color Talking-Pictures. $695.00. Write for free illustrated folder. Berndt-Bach, Inc., 7343 Beverly Blvd., Hollywood 36, Calif.

PHOTO FINISHING

2 BEAUTIFUL HI-GLOSS prints each good negative and enlarging coupon with each 6 or 8 exposure roll developed 28c. Owlphoto Co., Weatherford, Okla.

AUTOMOBILES—MIDGET CARS

"SPEED AND Power" Handbook—128 enameled pages! Covers all makes of cars! Fifty Breathtaking Chapters . . . Including "Jet Propulsion"—"Racing Frames"—"Wheel Geometry"—"Dynamometers"—"Reciprocating Masses"—"Gear Ratios"—"Dual Pipes"—"Fuel Formulas"—"Porting"—"Balancing"—"Lowering"—"Relieving." Authentic—direct from California! Shows exactly how to build your own Dual Manifolds. Superchargers. Hot Cams. Water Injectors. Hi-Compression Heads. Mileage Devices! Save—Save! Get up to ten more miles per gallon—racing speed, lightning acceleration. Get dynamic power increases from any passenger automobile! Build fast Stock Cars. California Roadsters. 160 M.P.H. Rods! Includes construction drawings! Tuning Techniques! Speed Tricks! Economy secrets! Ingenious formulas! Plus "California Customizing"—Photographs. Diagrams. (Newest ideas). Conversions. (Re-styling all makes). Also, big "Speed Equipment Picture-Catalogue." Plus "Alcohol Injection." Plus—36 page "Economy Handbook." 300 Illustrations. Five items—$1.98 postpaid. Newhouse Automotive Industries, 5805-C2 East Beverly, Los Angeles 22. (See page 187).

"S-P-E-E-D & MILEAGE" Manuals—World famous Power Book shows how to double your power, gas mileage—get terrific acceleration! Covers all cars—Shows Simplified Speed Tuning, "Souping," Racing Tricks, "Customizing," Economy Secrets, Hotrod Plans, Championship Methods! Covers Racer Construction, California Roadster Building, Sports Conversions, Engine Rebuilding, Frames, Fuels, Formulas, Ratios, Bodies, "Indianapolis Tips"! Shows easy ways to build speed equipment, Superchargers, Dual Manifolds, High Compression Heads, Dual Mufflers, Racing Cams, Water Injectors, Economizers! (Reveals 100 ways to save gas) Also covers "California Custom Restyling," Streamlining, Lowering, Sport Changes! Diagrams! Photographs! Charts! 320 Illustrations! "Big Manual" plus Speed Equipment Catalog plus "California Hotrod Handbook"—Three Books $1.98 (Guaranteed). Almquist Engineering, Dept. 11X, Milford, Penna.

FLOYD CLYMER'S new antique automobile book Treasury Of Early American Automobiles Published by McGraw-Hill, Foreword by James Melton, 224 large pages, 500 illustrations. New York-Paris, Indianapolis, Vanderbilt Races, Glidden Tours, Cartoons, songs, early motoring styles, costumes. Gasoline, steam, electric, spring driven automobiles illustrated, described. 1600 American automobiles named. Latest, finest largest, most interesting book ever published automobile history, illustrations never before shown. Beautiful cloth binding, attractive colored cover. Wonderful gift. $5.00 postpaid. C. Clymer, 1268 S. Alvarado, Los Angeles 6, Calif.

AUTOMOTIVE COLLECTORS, machanics, hobbyists: Now, for the first time, a new and growing non-profit organization provides old car literature, new car information, engineering papers, shop manuals, glossy photos, data books, free magazines. Write today and get on free mailing list. Auto Maniacs 2, Stockbridge, Mich.

R-A-C-I-N-G EQUIPMENT from California—Speed-Dress-Up Accessories for e-v-e-r-y make passenger automobile. Also, Racing Ignitions, Carburetors, Flywheels, Camshafts, Water Injectors, Mufflers, Crash Helmets, Jet Engines—Thousands of items in stock! Dual Manifolds (for "Jeeps" to "Rockets")—Finned Hi-Compression Heads—covering 155 makes—models. Big "1951 Illustrated Catalogue"—plus, "Driving Economy"—25c. (Dealers, request Wholesale Catalogue). Newhouse Automotive Industries, 5805-C7 East Beverly, Los Angeles 22.

SPEED EQUIPMENT! "Free Six Monogram Initials" with order—Chrome Exhaust Megaphones $1.55, Hollywood Mufflers $4.50, V-8 Duals $15.90, Racing Stacks 98c, Dual Manifolds $9.95, Adjustable Tappets $9.95, Camshafts $29.95, V-8 Hi-Compression Heads $23.50, (Finned Aluminum $49.50) Bargains Galore! Big Illustrated Catalog 25c. (Dealers Wanted). Almquist Engineering, Milford 14X, Penna.

1950 INDIANAPOLIS RACE Official Yearbook by Clymer. New larger, better than ever. 112 pages, 300 photos. Articles by famous authorities. Technical information, feature stories, driver histories, cartoons, newsy comments. The "bible" of Indianapolis racing. $1.50 Postpaid. Fabrikoid bound Deluxe Edition $3.00. C. Clymer, 1268 S. Alvarado, Los Angeles 6, Calif.

CALIFORNIA CUSTOM accessory headquarters. Buy direct from original designers and save. Chrome dash panels, solid hood sides, grille panels, speed equipment, dual pipes, push button door conversions, chrome motor accessories, fender skirts. 34 page illustrated catalog 25c. Eastern Auto, 3319G South Grand, Los Angeles 7, Calif.

FROM SPEEDWAY to Roadway! Track-proved Hi-Speed Heads and Manifolds now available for your passenger car! No special tools needed! Increase horsepower 25%! Astounding Getaway! Free illustrated Catalog. Speedsport, 6215-M Diversey, Chicago 39, Ill.

SPECIAL RACING Cars And Hot Rods Of The World Book. 160 photographs, charts, drawings. Complete mechanical information cars of all nations. Supercharging, engines, suspension, transmissions. Postpaid, $1.50. C. Clymer, 1268 S. Alvarado, Los Angeles 6, Calif.

SOUPING THE Stock Engine. Explains the 5 paths to power, covers all engines from road to track, effective speed tuning theories, tells why and how, 150 photos, charts, drawings, fuels. All new. Postpaid $2.00. C. Clymer, 1268 S. Alvarado, Los Angeles 6, Calif.

FREE "HOT Rod Power Digest"—included with Big 1951 Speed Equipment Catalog showing 1000 Accessories, Hollywood Mufflers, Duals, Manifolds, Racing Cams, Heads, Bargains!—Complete 25c. (Dealers Wanted). Almquist Engineering, Milford 15X, Penna.

WIGLESWORTH-CHASTEEN'S Automobile History Scrapbook No. 1—just published! Over 250 ads and illustrations of antique and vintage automobiles—all new material moneyback guarantee. $1.50 Wiglesworth-Chasteen, 7134-M3 Alhambra, Mission, Kan.

CYCLE—MONTHLY motorcycle enthusiasts' magazine. Road tests, technical data, foreign and domestic. Many illustrations. Sample copy 25c. One year—$3.00. Cycle, 1015 So. La Cienega Blvd., Los Angeles 35, Calif., Dept. MI.

SPORTS CAR Engine Book. Complete information speed tuning, design, maintenance. Postpaid, $1.50. C. Clymer, 1268 S. Alvarado, Los Angeles 6, Calif.

BULLETIN 151. CUT operating Costs. Prolong engine life without gadgets, additives or trick driving. Proven. $2.00. Hastings, Box 4713, Los Angeles 1.

MOTOR TREND Magazine—Custom, foreign, domestic, sports cars. Road testing, racing, auto shows, etc. Sample copy—25c. Full year—$3.00. Motor Trend, 1015 So. La Cienega Blvd., Los Angeles 35, Calif., Dept. MI.

HOT ROD—The only monthly magazine about building roadsters, streamliners, etc. Sample copy 25c, $3.00 yearly. Hot Rod, 1015 So. La Cienega Blvd., Los Angeles 35, Calif., Dept. MI.

CHEVROLET OWNER'S Handbook. Complete data servicing all Chevrolet cars, 1929 to 1950 inclusive. Powerglide. Postpaid $1.50. C. Clymer, 1268 S. Alvarado, Los Angeles 6, Calif.

MODERN MOTOR Car Magazine—Facts, figures, photographs and features on all cars. Sample copy 25c; $3.00 yearly. Crestline Publications, Box 581-C, Holliston, Mass.

PERFORMANCE CHART—Compare 0-60, Top Speed, Gas Mileage Of Latest Stock Models—25c. Sonac Co., Box 278-C, So. Norwalk, Conn.

"WATER INJECTION." Also—Speed—Power—Economy—Methods! Free Illustrated information. Neher Industries, La Verne 2, Calif.

AUTO SUPPLIES & EQUIPMENT

ENJOY NEW-CAR pep and power in your old Buick. Same day service from World's largest stock of new (not rebuilt) Buick parts and engines. Ship anywhere. Write today. Robertson Buick Co., 1003 S. Wabash Ave., Chicago 5, Ill.

ELECTROPLATE METALS And Non-Metals With The Tyco Electro-Plater! Portable. Inexpensive. Free Booklet. Tyco Metals, Box 13231-G, Houston 19, Texas.

MOTORISTS SAVE gasoline by Vacu-mating overrich mixtures. Fits all cars. For Free particulars write Vacumatic, Dept. 1691, Wauwatosa, Wis.

BRUSH PLATING Outfits connect to a battery. No tanks or shop required. Free particulars. Gunmetal Co., Ave. B, Decatur, Ill.

SUPERCHARGER—McCULLOCH '33-'39 Ford V-8; A-1 condition; $99; Ligda, Box 108B, Concord, Mass.

SILENCE OVERHEAD-VALVES, attachments unnecessary. $2.00. Derderian, Box 542, Sandston, Va.

CAR STARTING Made Easy—Add 3 Cheap Parts—Write, Car News, Box 1322, Pontiac, Mich.

SEND FOR Free Life Membership Card. "Water Burners" of America, La Verne, Calif.

MOTORCYCLES, BICYCLES, MOTOR SCOOTERS

MIDGET RACER, less motor $10, 1946 Whizzer $15; 1938 Cushman $35; James motorcycle $45; Indian $30; Smith motor-wheel $8; Motorbike conversions $5; 2 h.p. engine $5. Four balloon tires $3 (Mailorder only). Send 25c for catalogue Number Thirty-Nine just out listing these and hundreds of other bargains, in new and used machines, parts, plans, War Surplus, etc. (35c by First Class Mail). Midget Motors Directory, Athens, Ohio.

RECONDITIONED MOTORCYCLES and motors. Chromium accessories. Complete stock Indian parts. Expert rebuilding. Fast Service. Indian Motorcycle Sales, Kansas City 1, Mo.

MOTORCYCLE MAGAZINE—Worldwide coverage. Yearly Subscription $2.00. Sample 20c. Motorcycle News, 5424-C Sawyer, Chicago 25.

ENGINES, MOTORS

ICE-SLED ENGINES, Small airplane radial type. Write for descriptive literature. Gaare Supply Co., Box 277, Weatherford, Texas.

classified section

MOTORS ½ HORSE $15. ¾ $22. 1 $35. Compressors $17.50. Other bargains. State your needs. Butler, 1885 Milwaukee, Chicago 47.

ELECTRICITY & ELECTRICAL SUPPLIES

LAMP PARTS—Sockets, wire, harps, cords, bases, pipes—all parts to build and repair. 64 page catalog with charts and instructions 25c. Gyro Lamps, 5402M Clark, Chicago 40.

FREE—SEND for New Catalog. Bargains in Welders, Motors, Generators, Surplus Equipment. Or, Build Your Own and Save. LeJay Company, Minneapolis, Minn.

LAMPS—ELECTRIFY oil lamps, vases, bottles, etc. Instructions 10c. Fisher Lamp Supplies, 3825M Eastern Avenue 26, Cincinnati, Ohio.

NEW! PEN-SIZE Tester, without leads, 100-600 volts. $1. Palmer Pen-Prod, Hickman Mills 3, Mo.

ELECTRIC PENCIL: Engraves all Metals $1.25. Beyer Mfg., 10511-G Springfield, Chicago 43.

MACHINERY, TOOLS & SUPPLIES

BANDSAW—SPECIAL offer—greatest value! Regular $48.00—now only $26.50! Includes latest features—smartest design—guaranteed!! Act fast! Write today for free literature! American Saw, 323 Russell North, Minneapolis 5, Minn.

SCREWHOLDING SCREWDRIVER. No prongs, push in, pull out. Guaranteed. $2.00 Postpaid. Hendrix Tool Specialty, Box 6846, Kansas City 4, Mo.

WELDING—PLATING—SOLDERING

RADIATOR REPAIRING, cleaning, recoring. How to equip small shop at low cost. Supply sources, trade secrets. Instructions now only $3.50 postpaid. Radiator Service, McBain, Mich.

AUTO RADIATOR Repairing Supplies, equipment, books, gasoline torch. Write. John Curfman, Maryville, Mo.

FOR INVENTORS

INVENTORS: LEARN how to protect your invention. Unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and prepared to serve you in handling your patent matters. "Patent Guide for the Inventor" containing detailed information concerning patent protection and procedure with "Record of Invention" form will be forwarded to you upon request—without obligation. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 13A-A District National Building, Washington, D. C.

INVENTORS—IF you believe you have an invention, you should find out how to protect it. The firm of McMorrow, Berman & Davidson with offices in Washington, D. C., is qualified to take the necessary steps for you. Send for copy of our Patent Booklet "How to Protect Your Invention." We will also send you an "Invention Record" form. No obligation. They are yours for the asking. McMorrow, Berman & Davidson, Registered Patent Attorneys, 1384 Victor Building, Washington 1, D. C.

INVENTORS—SEND today for booklet "Patent Protection for Inventors" giving detailed patent information and preliminary steps to take toward patent protection,—also "Evidence of Invention" form. Victor J. Evans & Co., 670-A Merlin Building, Washington 6, D. C.

MALLARD PLANS

Here's a 14 ft. plywood duck boat that's "made to order" for hunting. She's light for car top carrying, plywood planked for strength and dryness, and low enough to make a good blind. Plans show either double-ended or square stern. Plan No. 8-143, price $1.00. Send order and remittance to: Mechanix Illustrated Plans Service, Fawcett Building, Greenwich, Connecticut.

INVENTORS: THE usual First Step is to have a search of the U. S. Patents conducted, so I can report on Patentability. Write, without obligation. Patrick D. Beavers (formerly Randolph & Beavers), Registered Patent Atty., 925 Columbian Bldg., Washington (1), D. C.

PATENT OFFICE searches, Patent applications prepared, Patent drawings, Invention marketing, Protection forms free. For complete Inventor's services write: Industrial Patent Reports, Box 1081, Massachusetts and North Capitol, Washington 13, D. C.

ACTION—ACTION—Action. Inventors with patented and patent pending inventions for sale or lease request FREE book. No obligation. Dept. 3-F, U. S. Patent Exchange, 239 Hellman Bldg., Los Angeles 13, Calif.

PATENT SEARCHES, $5.00, including patent copies. Reliable and accurate reports. Free protection forms, 48 hour service. Patent Service Institute, 945-G Pennsylvania Avenue, Washington 4, D. C.

PRECISION SCALE Models. Mechanical working models or mock-ups. Patent models developed and built, made of wood, metal, or plastics. Write Harold H. Freitag, Box 173, Tappan, N. Y.

PATENT SEARCHES by former Patent Office Examiners $5.00. 48-hour service. Protection forms free. Write Patent Engineering Service, 1404 New York Avenue, Washington 5, D. C.

PATENT SEARCHES $5.00. Reports airmailed within 48 hours. Invention protection forms free. Write Miss Ann Hastings, Patent Searcher, P. O. Box 176, Washington 4, D. C.

PATENT SEARCHES $5.00. 48-hour service. Patent copies included. Protection forms free. Write Raymond L. Smith, Patent Searcher, 410 Bond Building, Washington 5, D. C.

INVENTORS: IF you have an invention for sale, patented or unpatented, write Institute of American Inventors, Dept. 50B, 631 E Street N. W., Washington 8, D. C.

INVENTORS. FOR "Record of Invention" form, contact Carl Miller, Registered Patent Attorney, Woolworth Building, New York.

INVENTOR'S GUIDE free on request. Frank Ledermann, Registered Patent Attorney, 154 Nassau St., New York, N. Y.

MAYBE YOU should not apply for a patent! Free details. F. I. Roth, 657 East 26 Street, Brooklyn 10, N. Y.

INVENTIONS PROMOTED. Patented or Unpatented. Write Adam Fisher Co., 582 Enright, St. Louis, Mo.

INVENTIONS WANTED

NATIONALLY KNOWN manufacturer wants invention (pat. or unpat.) with wide demand. Please give full details in first letter for contract. Dean Studios, Dept. NP-10, Des Moines 2, Iowa.

INVENTORS: HUNDREDS of manufacturers have requested our assistance in locating marketable new products. Complete information, free. Institute of American Inventors, Dept. 50-C, 631 E Street N. W., Washington 8, D. C.

ACTION—ACTION—Action. FREE book to inventors with patents and patent pending inventions for sale or lease. No obligation. Dept. 3-W, U. S. Patent Exchange, 239 Hellman Building, Los Angeles 13, Calif.

INVENTIONS WANTED. Patented or Pending only. Inventors Exchange-C, Hartford 1, Conn.

MODELS & MODEL SUPPLIES

GJOA, ARCTIC sloop, and City Of Pekin, steam canal barge, Two new kits. Also Notebook For Shipmodel Builders, by Pratt. 32 pages, illustrated $1.00 post paid. Send 25c for new 1951 catalog. Folio 30, Model Shipways, 476 Main St., Fort Lee, N. J.

KIT FOR Lake Schooner "Challenge"—1852 with 12" carved hull and fittings sent postpaid for $11.50. Our 40 page illustrated catalog 25c. A. J. Fisher, 1002-B Etowah Ave., Royal Oak, Mich.

POWER MODELS. Unusual steam, gasoline and traction engines. Metals, tools, accessories. Catalog 50c. Charlie Cole, Ventura, Calif.

PATENT ATTORNEYS

INVENTORS: LEARN how to protect your invention. Unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and prepared to serve you in handling your patent matters. "Patent Guide for the Inventor" containing detailed information concerning patent protection and procedure with "Record of Invention" form will be forwarded to you upon request—without obligation. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 13B-A District National Building, Washington, D. C.

INVENTORS—IF you believe you have an invention, you should find out how to protect it. The firm of McMorrow, Berman & Davidson with offices in Washington, D. C., is qualified to take the necessary steps for you. Send for copy of our Patent Booklet "How to Protect Your Invention." We will also send you an "Invention Record" form. No obligation. They are yours for the asking. McMorrow, Berman & Davidson, Registered Patent Attorneys, 1385 Victor Building, Washington 1, D. C.

INVENTORS: WHEN you are satisfied that you have invented something of value write me, without obligation, for information as to what steps you should take to secure a Patent. Write Patrick D. Beavers (Formerly Randolph & Beavers), Registered Patent Atty., 924 Columbian Bldg., Washington 1, D. C.

INVENTORS. FOR "Record of Invention" form, contact Carl Miller, Registered Patent Attorney, Woolworth Building, New York.

PATENT INFORMATION Book and Inventor's Record, free. Gustave Miller, 10-C Warner Building, Washington 4, D. C.

C. A. SNOW & CO., 1-427 Snow Bldg., Washington 1, D. C. Registered patent attorneys. Literature mailed on request.

INVENTOR'S GUIDE free on request. Frank Ledermann, Registered Patent Attorney, 154 Nassau St., New York, N. Y.

MODEL RAILROAD SUPPLIES

RAILROADERS, 50c GETS 1950 catalog reference manual. O or HO gauge. Walthers, 255 Erie, Milwaukee 2, Wis.

PATENTS

INVENTORS: TEST the Commercial value of your patented or unpatented inventions, quickly and inexpensively. Write for free information. Institute of American Inventors, Dept. 50-A, 631 E Street N. W., Washington 8, D. C:

INVENTIONS PROMOTED. Patented or Unpatented. Write Adam Fisher Company, 582 Enright, St. Louis, Mo.

BLUEPRINTS & PLANS

BUILD AN Adobe House. Plans and elevations for the construction of a modern picture-window home built with stabilized adobe brick are now available. The overall dimensions of this ranch-style dwelling, excluding a separate garage and studio, are 64x37 ft. It contains two bedrooms, a kitchen, a living room (10x30 ft.), a dining room and a nine-foot wide porch that is 44 ft. long. A wood-burning fireplace features a storage bin for wood that's stacked from the outside of the house. Price for plans are $6.00 per set; additional sets are $3.00 when ordered at the same time. Send your money and request to Fawcett Publications, Greenwich, Conn. Please ask for Plan No. 50.

BOATS, OUTBOARD MOTORS

FULL SIZE cut to shape patterns, blueprints, $3.75 up. Pleasure boats, to 38 feet. Illustrated "Build a Boat" catalog, 25c. "How to Build Boats" book $1.00. Polywog Houseboat Plans, $10. Marine Catalog $1.00. Cleveland Boat Blueprint Co., Dept. A-23, Cleveland 13, Ohio.

FASTEST BOATS In The World—Build Now. Complete plans available for sleek Three Point Racing Hydroplanes, Runabout and others. Send 25c immediately for informative literature. Champion Boats, P. O. Box 7132-C, Long Beach 7, Calif.

GET OUR big 224-page low price marine hardware and boat equipment catalog. Send $1.00 to cover packing and mailing —refunded with first order. Garland Frasher Marine Sales, 540-31st Street, Dept. P, Huntington, W. Va.

STEERING WHEELS, windshield brackets, from $6.95. Modern fittings, water skis at lowest prices. Complete pre-cut plywood boats. Bargains galore. Folder 10c. Marine, Box 681, Mendota, Minn.

SAVE ⅔ COST. Assemble your own boat. We furnish parts. No experience necessary. Rowboats, Cruisers. Illustrated Catalog 25c. Midwest Boat Company, Menomonee Falls 3, Wis.

HIGH SPEED outboard motor tuning and Souping Up methods. Instructions $1.25. Excello Marine Sales, Post Office Box 71, Stratford, Conn.

MARINE CONVERSIONS for Ford and Jeep engines. Catalog 10c. Lehman Manufacturing Company, Department C, Newark 2, N. J.

NEW, USED, rebuilt marine motors. Marine conversions, fittings. FREE catalog. Stokes Marine Supply, Dept. 21, Coldwater, Mich.

BUILD-IT-YOURSELF

WHY DON'T You Build? Plans: Endtable 30c, Bookcase 30c, Bookcase 60c. All 3 $1.00. Folder 10c. Craft-Plan, Box 581, Los Angeles 43, Calif.

BUILD YOUR Own "Tractor." Plans. Walking, riding. Free information. Ellsworth Tractor Co., D-9, Camptonville, Calif.

70 LAWN-ORNAMENT AND novelty patterns $1. Write for new price list. Mosbro Patterns (I), 44 Victor, Mimico, Ontario.

BUILD INEXPENSIVE Concrete Blockmaker, Also Mixer. Motor-Hand. Write. C. Lee, Mountain View-9, Okla.

"CONCRETE BLOCK Homes." 32 page booklet on how to build, $1.00. H. C. Lightfoot, Civil Engineer, Richboro 25, Penna.

HOME CRAFTSMEN

DURABLE, STAIN-PROOF, alcohol-proof, easy to clean Plastic covering for tables, counters, sinks, bathrooms and hundreds of other uses. High gloss surface, popular Mother-of-Pearl, grey, red, yellow, green, blue. Linen, red, tan, grey. Light and dark woodgrains. Designed for on-the-job applications. Widths 24", 30", 36", and 42". Lengths to 30 feet. 95c per square foot. Mastic for applying, $1.75 a quart. Complete instructions and literature. Plastic Home Products, Box 3318, Merchandise Mart, Chicago 54, Ill.

28 LAWN ORNAMENT patterns 25c. Other patterns: 15"-20" high; Dutch girl; Dutch boy, pirate, bull terrier, Mexican girl, Mexican boy, dwarf, penguin, flower girl, 10c each; 3 for 25c. 25 novelty patterns 30c. All 62 full size patterns $1.00 postpaid. Strother, Box 128-YA, Belington, W. Va.

LEATHERCRAFT. EVERYTHING needed by beginners, advanced hobbyists and professional leatherworkers. Largest stock of supplies in U. S. Moderate-priced tooling leathers, top quality calfskins, tools, supplies, kits. Send 10c for Big Catalog. J. C. Larson Co., 820 S. Tripp, Dept. 481, Chicago 24.

NEW LEATHERCRAFT Catalogue Pleasure & Profit, New Styles, Belts, Purses, Shoes, Largest Leathercraft School in U.S.A. G. I. Approved. Send 10c for catalogue, Dept. MI, Apache Leather Co., 2804 E. Washington St., Phoenix, Ariz.

16 NEW LAWN chairs, 22 picnic tables, benches, trellises, etc. All 38 plans with necessary full size patterns, $1.00. Mastercraft 13X, 7041 Olcott, Chicago 31, Ill.

LEATHERCRAFT, COPPER tooling, textile painting. Make spare time, profitable time. Free illustrated catalog shows everything you need. Kit Kraft, 7377 Melrose, Hollywood 46, Calif.

89 FULL SIZE Jig Saw patterns of beautiful shelves, ornaments, toys, novelties. Plus "How, Where to Sell. Only $1.00. Mastercraft 14X, 7041 Olcott, Chicago 31, Ill.

JIGSAW ENTHUSIASTS—Send 50c for sample and illustrated list of revolutionary new projects. Satisfaction guaranteed. Samson Enterprises, 1210-M 17th St., Rockford, Ill.

GARDEN FIGURES, lawn chairs, furniture, novelties, toys, etc., 68 popular plans, with full size patterns, $1.00. Mastercraft 11X, 7041 Olcott, Chicago 31, Ill.

JIGSAW OWNERS Attention! Start earning money at home cutting out wooden novelties and souvenirs. Write H. Cook, Dept. B, 4407 S. Normal Ave., Chicago 9, Ill.

90 ALL NEW, full size lawn ornament and novelty patterns, up to 20" high. Only $1.00. Mastercraft 12X, 7041 Olcott, Chicago 31, Ill.

PETRIFIED WOOD, multicolored, $1.00 pound. Postage paid. Roger Julian Donahue, Box 5763, College Station, Texas.

8 BEAUTIFUL FULL-SIZE Whatnot Patterns 35c. Joaness, P. O. Box 141-C, Omaha 7, Neb.

PLASTICS

NEW LIQUID Plastic. Clear, colors. Cast without heat. Embed flowers, insects, coins. Saw, drill, carve. Free Folder, "Liquid Magic," shows fine things you can make and sell. Write today. Castolite, Dept. A-104, Woodstock, Ill.

MOLDED PLASTIC letters and numbers. Samples .25c, information free. Plastic Exchange, Box 302, Bradenton 4, Fla.

LUCITE, PLEXIGLAS. Any size sheets, masked. Square foot (12x12) cost, 1/16" —$1.10; ⅛—$1.43; 3/16—$1.75; ¼—$2.07. Colors add 10%. Include 10% postage. Almac Plastics, 230 Fifth Ave., New York 1, N. Y.

"FREE" SAMPLE plastic and three experiments. Learn plastics at home. Send 3c stamp to Plastic Projects, Box 5151-B, Detroit 35, Mich.

PLASTIC, SHEETS, rods, tubes, etc. Free list. Plastic Supply Co., 2901 N. Grand Blvd., St. Louis 7, Mo.

SPORTING GOODS, FISHING TACKLE, GUNS

SHOTGUNS, RIFLES, revolvers, over 500 modern, obsolete, list 10c coin. Ed Howe, 28 Main, Coopers Mills, Maine.

BINOCULARS, TELESCOPES, MICROSCOPES, ETC.

TELESCOPE PLANS are available for building MI's Six-Inch Portable Reflecting Telescope. A superb astronomical instrument that will reveal the moons of Jupiter, the rings of Saturn and the polar caps of Mars. With it, you can read a newspaper headline at a mile. The plans are complete with photographs, drawings and detailed text. If you can fix a leaking faucet, you can build this telescope. Send your request and remittance of $2.00 to MI Reader Plan Service, 10 Fawcett Place, Greenwich, Conn. Please ask for Plan P-6.

TRIPOD PLANS. Unless you have a sturdy support for your telescope it will be virtually useless for good observing. For best results build MI's "Quarter-Ton" Tripod. Send 75c for plans and instructions to MI Reader Plan Service, Fawcett Place, Greenwich, Conn. Please ask for Plan No. P-7.

WAR SURPLUS Bargains, Binoculars, Telescopes, Sextants, Millions of Lenses, Prisms, Reticles, Eyepieces, Objectives, etc. Mail 10c for Big "Catalog CB." Send $1.00 for Stock CB—10-piece Lens Kit and Big Instruction Booklet. Edmund Salvage Co., Barrington, N. J.

POWERFUL ASTRONOMICAL telescopes easily made. Perfect lenses and instructions; 100X $3.00; 100X and 200X $4.00; 100X, 200X and 400X $6.00. Full power, clear vision. Instructions alone 10c. Suffolk Science, Riverhead, N. Y.

"FREE" CATALOGUE! Thousand war surplus optical bargains. Lenses, Prisms, Telescopes, Binoculars, etc. Send $1.00 for 10 lens Hobbyist Set and Project booklet. R. Jaegers, 93-08 95th Avenue, Ozone Park, 16, N. Y.

REFLECTING TELESCOPES, 60X completely assembled $25.00. Guaranteed observatory clearness. Free information. Skyscope, 475 Fifth Avenue, New York 17.

SAVE 50% ON new binoculars! Free Catalog. Free book, "How to Select Binoculars." Write today Bushnell's, 43-MX-12 Green, Pasadena 1, Calif.

TELESCOPES, BINOCULARS, Microscopes—big bargain catalog free. Brownscope Company, 24 West 45th Street, New York.

REFLECTOR TELESCOPE kits, refractors. Free illustrated bulletin. Rake Instrument Laboratory, 612 Adams, Hoboken, N. J.

DOGS, SMALL ANIMALS, OTHER PETS

SEE GOLDEN Hamsters ad on page 16. Shows picture of Hamster.

HORSE TRAINING

"HOW TO Break And Train Horses"—A book every farmer and horseman should have. It is free, no obligation. Simply address, Beery School of Horsemanship, Dept. 1151C, Pleasant Hill, Ohio.

classified section

RABBITS

EARN UP to $400 Monthly—Raise Angora Rabbits! Experience unnecessary. Wool brings $5 Pound. Plenty markets. Folder Free. White's Rabbitry, Newark 56, Ohio.

MAKE BIG Money! Raise Chinchilla Rabbits. Cash Markets Supplied for your production. Write Today! Rockhill Ranch, Sellersville 48, Penna.

BIG PROFIT in Angora rabbits. Free illustrated booklet tells how, lists market, successful raisers. Wilsons, Stanton 13, Calif.

RAISE GUINEA Pigs. Money makers. Booklet free. Taylors, B426E, Hapeville, Ga.

REAL ESTATE, FARM LANDS

FLORIDA. BEAUTIFUL homesites in new Lake County development, $245 at $10 monthly. Near Ocala National Forest, many pretty lakes, streams, pavement. World's best bass fishing, wonderful hunting. Safe from bombs. Folder free. Winston Vernor, DeLand, Fla.

GOVERNMENT AND State ranch, timber, hunting and fishing lands in California, Oregon and Washington at $1. to $5. per acre. 10c (coin) brings circulars. Pacific Lands, Box 2350-MI, Hollywood 28, Calif.

JEWELRY

RHINESTONES, JEWELRY settings, cameos, sequins, beads. Catalog Free. J & M Novelties, Dept. CA-5, Griffith, Ind.

JEWELRY MAKING. Illustrated catalog 20c. George Sassen, 35 Maiden Lane, N. Y. C. 7.

MISCELLANEOUS

RECEIVE GIANT Mails, Magazines! Three months 25c, year 50c. Waddell's Directory, 341 East 76th, New York 21.

TREASURE-MINERAL LOCATORS—Geiger Counters, ultra-sensitive, lowest prices, credit purchase plan free literature. Fisher Research Laboratory, Inc., Palo Alto, Calif.

OPEN, TEST Locks—Be Safe! 5 master keys open 70% locks. $1.00. Free details. National, 378 "K" Hooper Street, Brooklyn 11, N. Y.

DETECTIVES OPPORTUNITIES. Experience unnecessary. Detective particulars free. Write. Wagoner, 125-J West 86th, New York 24.

URANIUM PROSPECTING information Free; Prospector, Box 142 B, North Battleford, Saskatchewan, Can.

DRESSES 18c; COATS $1.00; Blouses 35c. Free Catalog. Crown, 164-PG Monroe Street, New York.

MINERALS—PRECIOUS STONES

MINERAL SPECIMENS, Cutting Material, Slabs, Rough and Cut Gems. All Qualities. Write for Free Booklet. Warren's Minerals And Gems, 1969C Abbott St., San Diego 7, Calif.

OLD GOLD WANTED

HIGHEST CASH Paid For Old, Broken Jewelry, Gold Teeth, Watches, Silverware, Diamonds, Spectacles, Platinum. Free Information. Satisfaction Guaranteed. Government Licensed. Rose Smelting Company, 29-K East Madison, Chicago.

IMMEDIATE CASH for broken watches, jewelry, diamonds, etc. Mail articles or write for shipping container. Lowe's, Dept. MI, Holland Bldg., St. Louis 1, Mo.

TOBACCO—PIPES

FACTORY SECONDS. Sensational value. Same genuine imported briar as our regular $10 pipes. Have only surface flaws not affecting superb smoking qualities. 2 for $1. Satisfaction guaranteed. Gaylords, Dept. 413, Brockton, Mass.

PERSONAL

"HOW CAN I Find Out?" You can! Information discreetly developed. Any matter, person, problem, anywhere. Worldwide. Officially licensed, bonded service. Established 1922. Reasonable. Confidential. William Herman, 170 Broadway, New York.

LOW COST Hearing Device. No Batteries, No Upkeep. Just a simple ear plug made of a non-toxic plastic. Many satisfied users. Beaudry, Dept. 5, 4337—30th Avenue South, Minneapolis 6, Minn.

YOUR LEATHER Jacket renovated by our craftsmen expertly, reasonably. Request Free descriptive circular. Berlew Mfg. Co., Dept. I, Freeport, N. Y.

HERE'S HOW and where to borrow $50.00 to $300.00 by mail. Confidential. Free particulars. Postal Finance Company, Dept. 47, Sioux City, Iowa.

EAST LOS Angeles. Post Mark letters remailed 25c each. Viewcards sent. Write Marvin Green, Box 6761 East Los Angeles 22, Calif.

SAN FRANCISCO. Have fun! Pretend you're here. Letters remailed; replies forwarded. $3. mo. Irene, Rm. 230, 742 Makret St., S. F.

SUCCESSFUL HAIRCUTS: Economy And Satisfaction. Booklet Tells How. 25c. Mastrolia 5½H Jane, New York City 14.

"INTERESTING MAILS"—25c keeps your mail box full three months. Bentz, Jr., Desk-C/53, Chatawa, Miss.

WATCHES, WATCHMAKING. ETC.

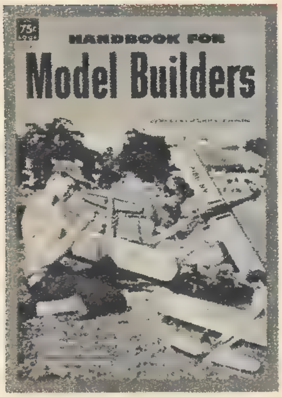
ANY WATCH Expertly Cleaned And Repaired. Flat rate of $3.50. One year guarantee. Charles Berkowitz, 1265 Olmstead Ave., Bronx 61, N. Y.

WATCHMAKERS', JEWELERS', Hobbyists', tools—supplies. Catalogue! Bengal Company, Culver City, Calif.

Watch For These 2 New FAWCETT BOOKS

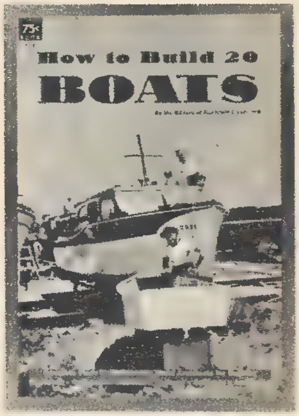
ON SALE JAN. 5

At Your Favorite Newsstand



HANDBOOK FOR MODEL BUILDERS . . . 144 pages packed with accurate plans and simple instructions for building over 25 different control-line and free-flight model airplanes, battery-driven boats and miniature autos . . . Also, a complete list of gasoline engines, tips on working with balsa wood and a special feature on Getting Started in Model Building. An ideal book for expert and novice alike. 75¢ (Order by mail, No. 112)

HOW TO BUILD 20 BOATS . . . The biggest boat book bargain afloat . . . Complete plans and data by outstanding naval architects for building rowboats, outboards, inboards, cruisers, sailboats, auxiliaries—everything from a 7½ ft. dinghy to a 27½ ft. houseboat. They're simple and sea-worthy. Build any one at a substantial saving over "showroom" models. 75¢ (Order by mail, No. 111)



Ask your dealer for these books. If he cannot supply you, send your remittance to: FAWCETT BOOKS, Dept. MI-1, Greenwich, Connecticut. Your order will be mailed the same day, postpaid.

For Every MI Fan . . .
2 Big New Fawcett Books

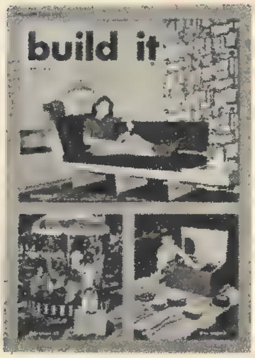
At Your Newsstand

LUCIAN CARY on GUNS . . . A compilation of the best gun articles from TRUE, The Man's Magazine, and written by America's most popular author on the subject. LUCIAN CARY on GUNS also contains a special section on American firearms with photos and complete specifications of over 130 models! A very colorful and educational 144-page book every gun owner should have. 75c (Order by Mail No. 109)

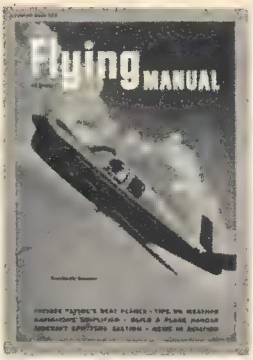
SPORT CARS and Hot Rods . . . TOM McCAHILL, Ken Purdy and John Bentley team up to bring you the latest in these fields. Some of the contents: How to Hop Up Your Car . . . The Fabulous Bugatti . . . The Forty Finest (a complete section covering the best foreign and U. S. sport cars with photos and specifications). Also a live, entertaining and informative section on Hot Rods. 75c (Order by mail No. 110)

SPORT CARS
and HOT RODS

[illegible]



BUILD IT . . . Over 50 practical, easy-to-make projects . . . swimming pools, modern furniture, fences, children's toys, radio sets, shop projects. (Order No. 101)

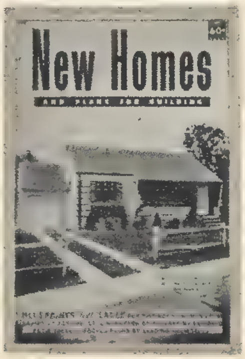


FLYING MANUAL . . . packed with data for the private flier. Tips on weather, navigation, a complete aircraft spotters section. For all flying fans! (Order No. 102)

INVENTOR'S HANDBOOK . . . For the amateur inventor. Data about Patents, Copyrights, Trademarks. Addresses of 100 firms interested in new ideas. (Order No. 103)

handy man's
home manual

HANDY MAN'S HOME MANUAL . . . The book for all home craftsmen. Featuring articles on home modernization. Over 50 pages on using power tools. (Order No. 104)



NEW HOMES . . . Thirty smart designs of Ranch, Colonial, Cape Cod and Modern homes costing from $5000 to $25,000. Blueprints are available. (Order No. 105)

photography

PHOTOGRAPHY HANDBOOK . . . Making photographic equipment . . . photo techniques . . . how to make this hobby pay. Plus a superb salon section. (Order No. 106)

Ask your dealer for any of these books. If he cannot supply you send your remittance to: FAWCETT BOOKS, Dept. MI-1, Greenwich, Connecticut. Your order will be mailed the same day, postpaid.

mechanix
illustrated
January, 1951

U. S. Armed Forces Will Buy Your Invention

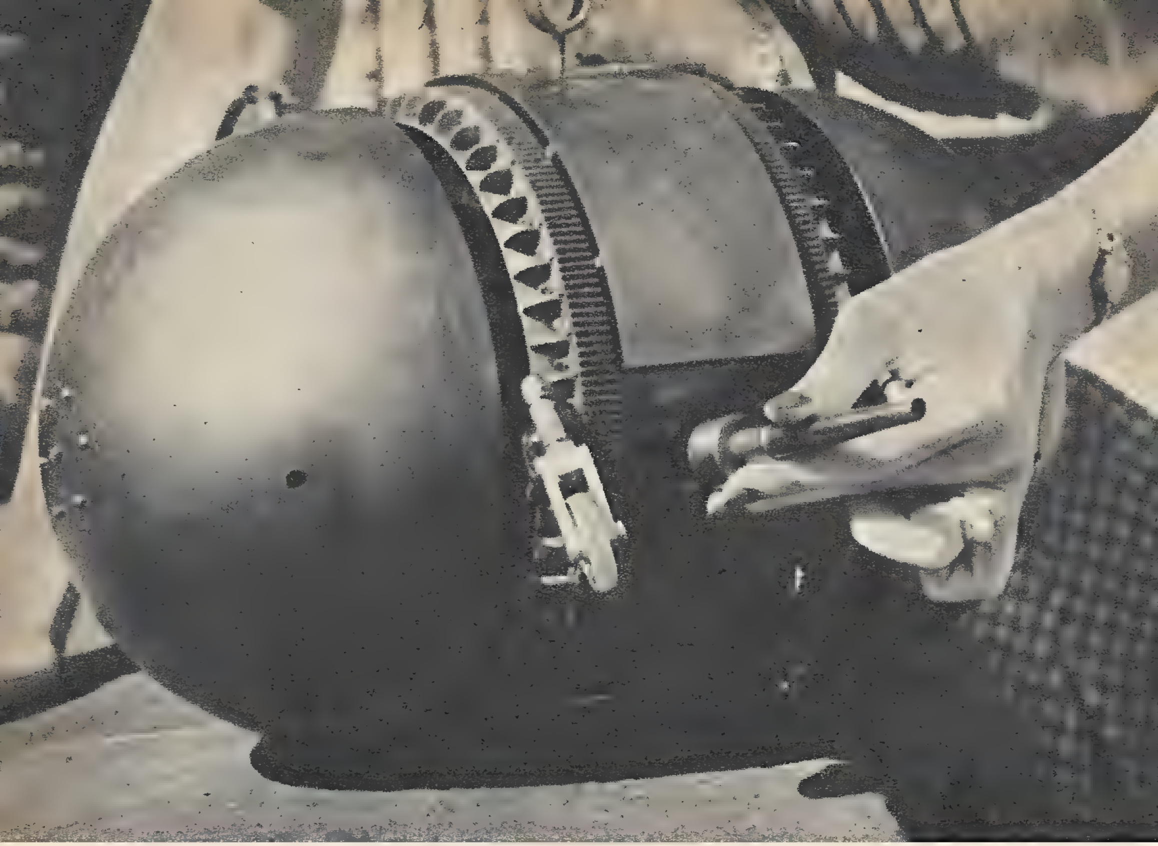
INVENT for
VICTORY
ALL AMERICANS WHO HAVE AN INVENTION
OR AN IDEA WHICH MIGHT BE USEFUL TO
THEIR COUNTRY ARE URGED TO SEND IT
IMMEDIATELY TO
NATIONAL INVENTORS COU
DEPARTMENT OF COMMERCE-WASHIN

Armored vehicle submitted to the National Inventors Council carries its own retractible bridge for crossing streams.

Once again the National Inventors Council is calling for military gadgets. Here's your chance to make a fortune as well as help your country.

By Ralph Coniston

TURN PAGE



Revolutionary tank submitted to the Council is propelled by two hemispherical wheels on each end. The middle part, prevented from rolling by trailer wheels, carries engine, crew and guns.

Invent These and Make a

FORTUNE

1—Lightweight, gasoline-operated over-snow vehicle
2—Device for burrowing tunnels through snow and ice
3—Method of destroying snow tracks
4—Inexpensive method for rapid conversion of snow and ice into drinking water
5—Revolutionary new communications method
6—Small, lightweight equipment to supply high voltage electricity
7—New method for generating acetylene
8—New material for automotive windshields
9—Mud and rain resistant method of making supplies visible during blackouts
10—Disposable rocket motors
11—Method of reducing noise of rocket propulsion
12—Substitute for bolts and cap screws
13—Shock absorber for mortars
14—Personal non-magnetic compass
15—Humidity indicator
16—Oxygen deficiency warning device
17—Non-mechanical high-speed camera shutter
18—Non-metallic structural materials
19—Absorbent for carbon monoxide
20—Gauge to measure explosion blast
21—Voice-transmitting gas mask
22—Device for protection against flame throwers
23—Automatic parachute opening device
24—Small, lightweight gasoline engine
25—Method for sealing cracks in cast iron

U. S. ARMED FORCES

AMERICAN inventors are on the verge of handing Russia a major defeat on the propaganda front. The Soviets have been jamming our Voice of America broadcasts and for the past year the nation's top electronics scientists have been working on a method to counter the Red's activities, at the suggestion of the National Inventors Council. And now officials report that success is near.

What is the National Inventors Council and how is it that the suggestion came from them? Well, the Council acts as an open door to inventors who want to submit ideas to the armed forces. Its job is to acquaint you with the problems confronting the military services and refer potentially valuable ideas to the appropriate agencies. Periodically, it issues lists of needed inventions.

The Council was organized just before World War II and evaluated 250,000 ideas during the war. The Armed Forces recognized its peacetime value, too, and it has continued as a division of the Department

Mother bomb, top, holds five smaller bombs which scatter in all directions on impact. Rocket propeller ship, above, has a hollow hull to insure greater speed by cutting down wind resistance.

Inventor A. Y. Dodge, top left, submits blueprints and finished product of a combined bearing and clutch. Chairman Charles F. Kettering, above, accepts Medal for Merit on behalf of the Council.

of Commerce. At present, ideas are being received at the rate of 8,000 a year—but the Korean war has caused an enormous spurt in submissions.

While the National Inventors Council must be most concerned with problems of the moment, it manages to look ahead, too. Take the case of Robert C. Harris, an inventor from Fort Wayne, Ind. Back in 1940 Harris sent in a device he had perfected—a small magneto operated by the closing of a hand. It didn't provide a continuous current—only a spark. The Council agreed that Harris' invention was ingenious, but what could the spark be used for? Neither Harris, the Inventor's Council nor the armed services could figure that out so it was shelved.

Several years passed and the army discovered that the bazooka's original ignition system was unreliable. What was the solution? They asked the National Inventors Council and the board remembered Harris' whatzit. His "useless" invention saved the day and brought Harris a fortune.

Perhaps you have some little gadget kicking around which you think is of no importance now. It may prove to be tremendously valuable to you and your country. During the last war, Dr. Borris Berkman, civilian scientist, suggested to the Council that milkweed floss should be substituted for kapok because supplies of this material had been cut off by the Japanese. As a result, Dr. Berkman got a government contract, set up the Milkweed Floss Corporation of America and formed an army of boy scouts to gather the floss and help win the war.

Another invention which did not sound at all military was Harry N. Peavey's plastic carburetor. But the army eventually found it useful in teaching mechanics the principles of repairing and maintaining carburetors.

Scoutmaster Charles Learned devised a signaling mirror which he regarded as little more than a plaything, good for occupying the minds of his scouts. Then early in the war the nation was stirred by the story of

Hedden mine detector was devised by Charles A. Hedden to help locate a buried treasure. He submitted it to the National Inventors Council and the invention itself turned out to be worth a fortune to him.

Dr. Boris Berkman, below left, thought of using milkweed floss to line Army clothes during the war when supplies of kapok were very short.

Captain Eddie Rickenbacker's ordeal while adrift for 23 days on a raft in the South Pacific. Search planes had passed overhead without sighting the party despite the desperate efforts of Rickenbacker and his companions to draw attention.

The armed forces were anxious to find some simple signaling device to attract fliers on similar search missions. A mirror seemed the obvious solution but sunlight reflected from a mirror cannot be seen unless the beam is focused directly on the searching plane, something difficult to accomplish with an ordinary mirror. Learned's signaling mirror seemed to do the trick and the Inventor's Council passed it on to the proper authorities. Learned refused to take money for his invention and it was some time before the Council convinced him that only by tying up the patent rights himself could he be sure that some greedy stranger would not be able to sting the Government.

Members of the Council, which screens all incoming ideas, are outstanding American inventors, scientists and industrial research men together with the U. S. Commissioner of Patents and representatives of all the armed forces. Chairman is Dr. Charles F. Kettering of General Motors and secretary is Lawrence Langner, one of the country's top patent attorneys.

If you present an idea to the Council, it first attempts to determine whether it is scientifically practical and whether it has advantages over existing devices serving the same purpose. For this it often asks the aid of the Bureau of Standards, the Patent Office and other Government agencies. If your idea is believed to be sound, the Council then approaches the proper authorities in the armed forces to discover whether they feel that the new invention would be useful to them. A battery, for example, might be called to the attention of the Signal Corps, the Navy and the Air Force. Certain types of guns would be presented to the Navy while others might be shown to Army Ordnance. Once the armed forces show interest, the Inventors Council's job is done. Arrangements for actual development and manufacture are taken care of by the armed forces and your payment will come from them.

If you want to propose an invention, here is the way to go about it: Write to the National Inventors Council, Department of Commerce, Washington 25, D. C. No special forms are needed for submitting ideas—just submit each suggestion as a separate document. Typewrite if possible and be sure to give your name and address. State the title of your invention, give a brief statement of its general nature and specific uses, explain the particular point of novelty or superiority of your invention in comparison with existing devices serving the same purpose. [*Continued on page* 180]

Bazooka was designed by a Swiss engineer, its launcher invented by Col. L. A. Skinner, above, and its ignition system perfected by Robert A. Harris through the Inventors Council.

Scoutmaster Charles Learned devised this signaling mirror as a plaything for his troupe. Then, Eddie Rickenbacker's ordeal on a lifeboat convinced him of its usefulness and he submitted it to the Council.

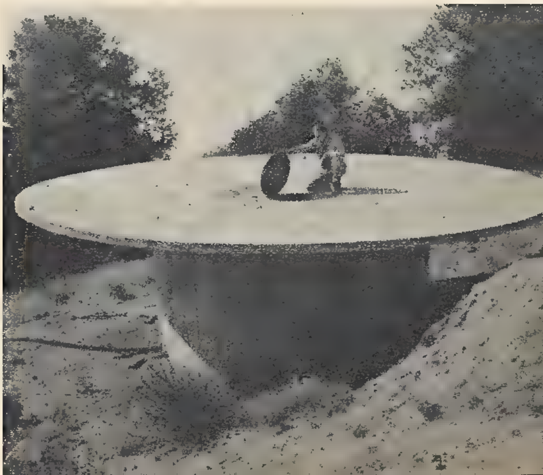
EMERGENCY SIGNALING MIRROR (ESM/1)

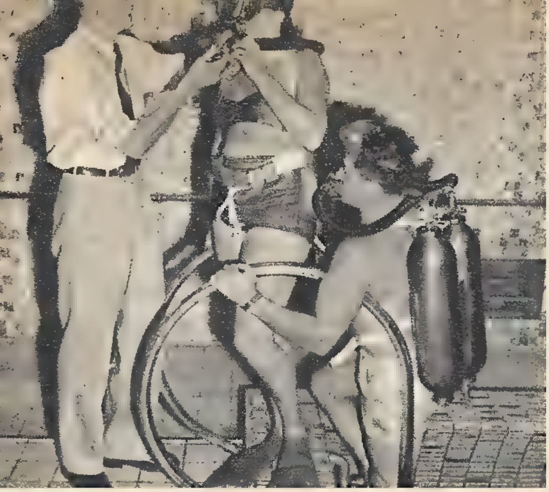
NEW in SCIENCE

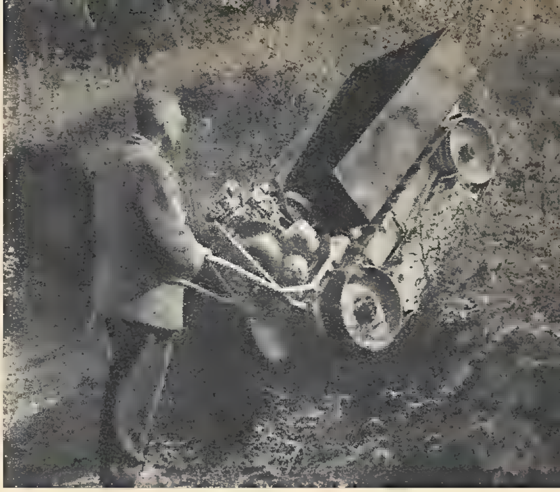
Sink-Proof bathing suit manufactured by a West-German textile firm is called "Florida Swimmer." The secret of its construction is a pattern of air-filled rubber strings woven into its fabric. It is useful for teaching non-swimmers. At top left it supports a child. Three suits float by themselves, above. Made by Strickwarenfabrik, Grueneberger, Rheydt, Germany.

Lounge Seats installed in 50 new coaches of the Union Pacific Railroad are the last word in comfort and will fit the lankiest passenger. Just reach down, pull a small fabric loop and a leg rest appears from beneath the seat as if by magic. It can be made to disappear just as easily. The seat backs recline in ten different positions. All cushions are made of sponge rubber.

Catchment Basin is the name given this peculiar tower built in the high mountains behind Pasadena, Calif. It is one of 53 water collectors used by the U. S. Forestry Service in fire fighting. Each consists of a storage tank surmounted by a concave platform with a perforated grating in the center. Capacity is 5,000 gallons which can be supplied by a winter's rainfall.





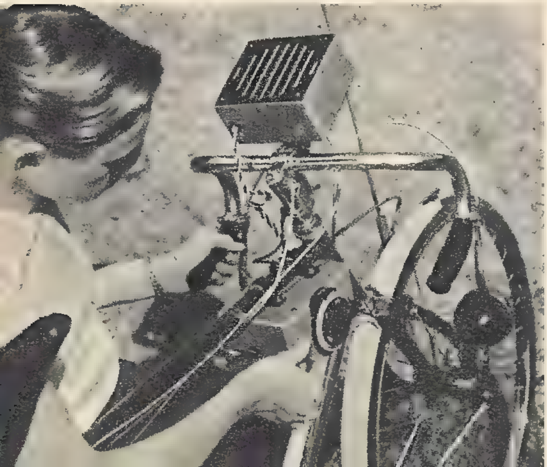


Aqualung is a new diving device demonstrated recently in the swimming pool of the French liner Liberte. It carries one, two or three tanks of compressed air, each of which enables the swimmer to remain under water for 30 minutes. Here Jacques-Ives Cousteau, co-inventor of the lung, makes an adjustment before tests. It has been used at a depth of over 300 feet.

Midget Caterpillar is designed to take the "pack off the back" of Ontario's Forest Rangers. It is driven by a six-hp motor and can carry an 800-lb. load. It is intended primarily for use during the fire season and in a demonstration has carried a complete power pump unit including pump, motor, hose, couplings, tool kit and fuel. It also can carry injured.

Bike Radio was designed and built by 17-year-old Nigel Deeks of Little Clacton, England. It has five tubes and operates on dry batteries which last three months and are carried in the rear saddlebag. The loudspeaker is fastened on the handlebar and the aerial is attached to the bike's front fork. Total weight of the set is three pounds. He also built his own TV set.

Electrical Index in this encyclopedia finds the answers to questions automatically. The book, which contains 100 pages, has a list of questions each followed by a colored symbol. When you push a button the color of which corresponds to the symbol of the question, a section of the electrical index lights up, indicating answer. Bergonzoli, Milan, Italy.

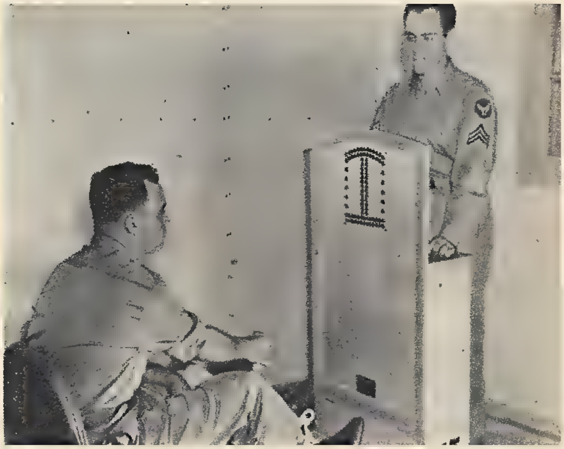


Fit to Fly a Jet?

OUR jets are the hottest things in the air and it takes hot pilots to fly them. Even the fighters cost a few hundred thousand dollars each and Uncle Sam makes certain he doesn't put a muttonhead behind the stick whenever there's flying to be done. It's easy for him to select good pilot material, however. The Air Force has formulated a series of tests which reveal a candidate's mental and physical alertness in short order. It's all done with lights, levers, noises and, of course, the necessary laboratory measuring instruments. There are vision testers, wobble meters and spinning chairs. A few are explained here. Think you could qualify? •

SWAY COMPENSATOR measures sense of balance and instability caused by height. Cadet stands on moving table and tries to keep stylus centered in hole.

CODE SHAPES determine the ability of a blindfolded candidate to identify objects by touch. Sometimes plane's controls must be selected by feel.



COORDINATION TEST requires hands and feet to balance stick and rudder pedals respectively until red and green lights on front panel form straight lines.

DISCRIMINATION TIME TEST requires the cadet to switch on a colored light corresponding to one on master control. A clock records reaction time.

BI-MANUAL TEST has a peg which travels in a triangular groove. Perfect coordination keeps it on course and out of notches which might stop it.

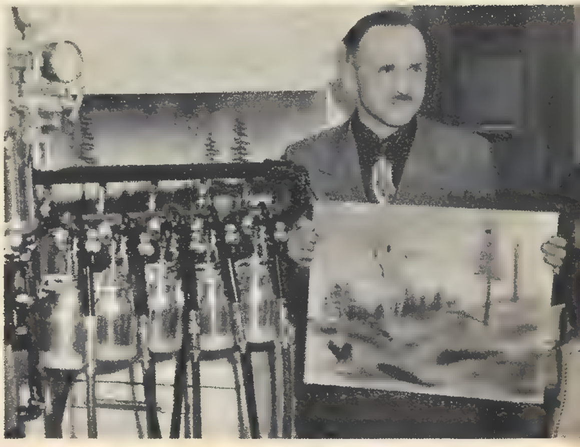
spray-gun artist

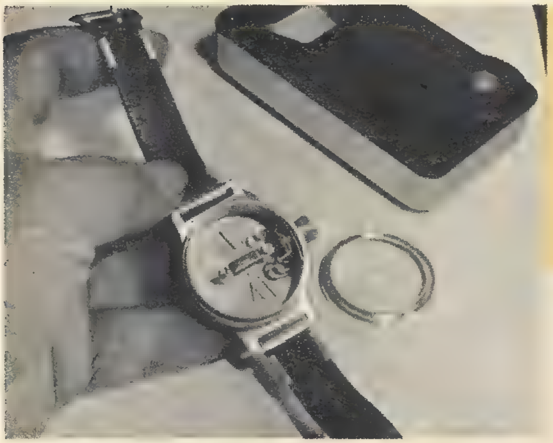
WE wonder if the old masters, da Vinci, Rembrandt and Rubens writhe in their graves when Ralph DeGayner takes up his spray gun in pursuit of the Muse! For he seems to have reduced art to a mechanized process far removed from subtle nuances with a brush.

In his studio he has a battery of spray guns with which he can blow out a landscape in five minutes. In one year he produced the amazing number of 1,500 paintings but now he limits his annual output to 300. This permits more time for lecture tours.

"I'm the only painter in the world who doesn't own a brush," says DeGayner. "And I practiced for six years to get the right trigger touch."

There's one startling difference between his work and that of the masters. A simple DeGayner sells for 20 bucks. •





atomic watch

A wrist radiation meter is a new device developed by Drs. C. and T. Lauritsen, father and son, of California Institute of Technology in Pasadena. Its most important function, say its creators, will be to detect the presence of radiation and so prevent mass hysteria which might result from atomic "scares."

This meter operates like a high-school gold-leaf electroscope. Winding the knob places a static electric charge on two aluminum strips which thereupon repel each other and separate. If atomic radiation in dangerous quantities is present, the instrument discharges and the strips come together again. •

SETH THOMAS

The Most Important 30 Minutes of Your Life

By Lester David

AT 12:30 p. m. an atomic bomb is going to explode in your city! Radar has spotted an enemy airplane and disclosed its course, speed and the arc on which it is traveling.

It's noon now and you have 30 minutes—1800 crucial seconds—to prepare for the bomb. What will you do?

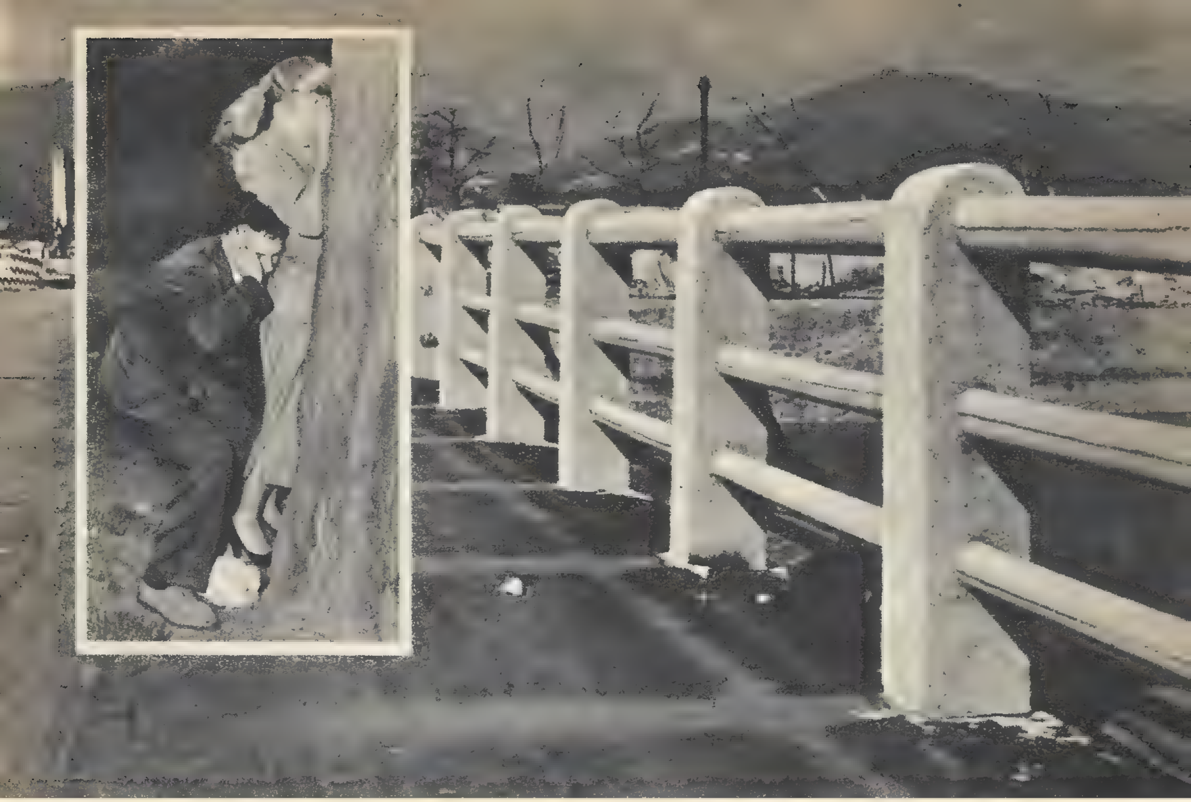
You and your family can survive if you take the proper precautions at the proper time. Atomic scientists, civilian defense authorities, army officials and Red Cross disaster chiefs agree on this.

But what *are* the proper precautions? How can you best utilize those precious 30 minutes once the siren warns of an attack?

Out of the mass of data offered by the experts, a specific pattern of action emerges. Here are the three basic rules, more vital than any you have ever read.

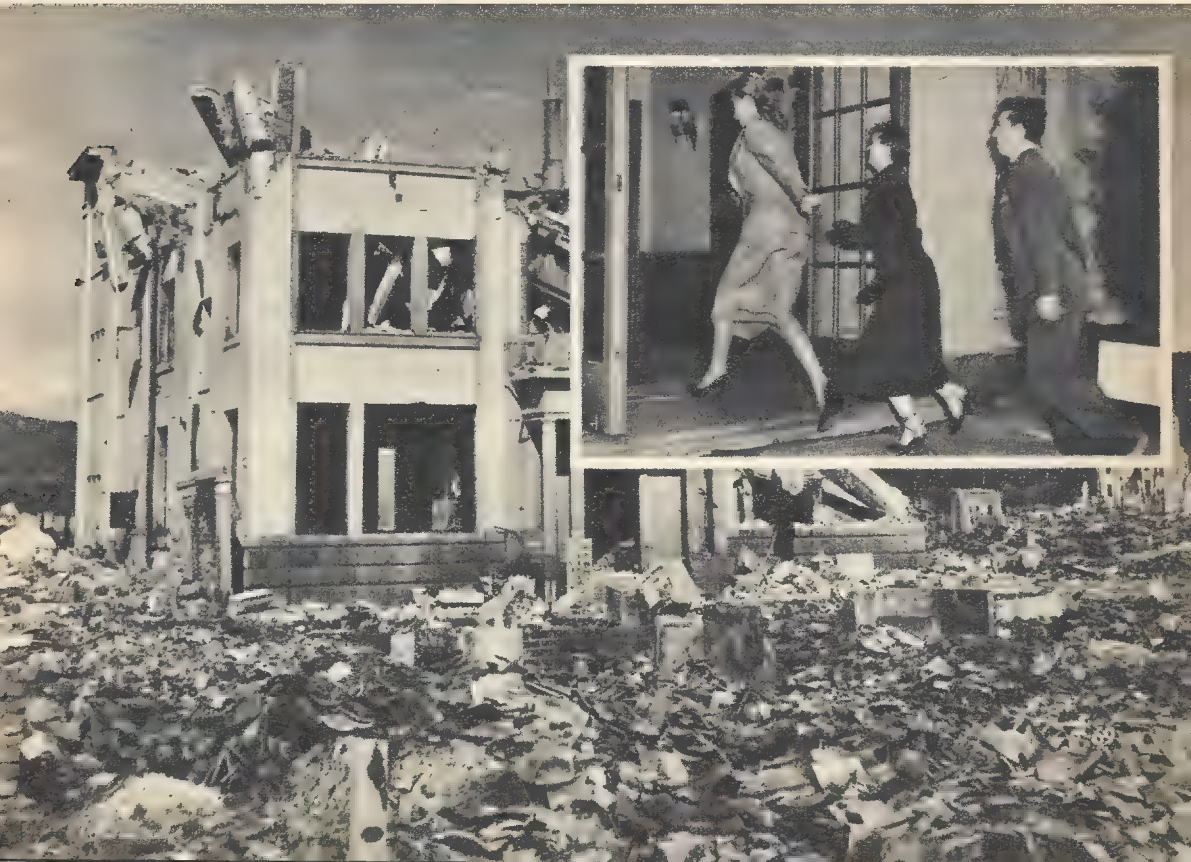
1. Do not try to run away.
2. Get to a shelter.
3. Stay in your shelter until it is time to leave.

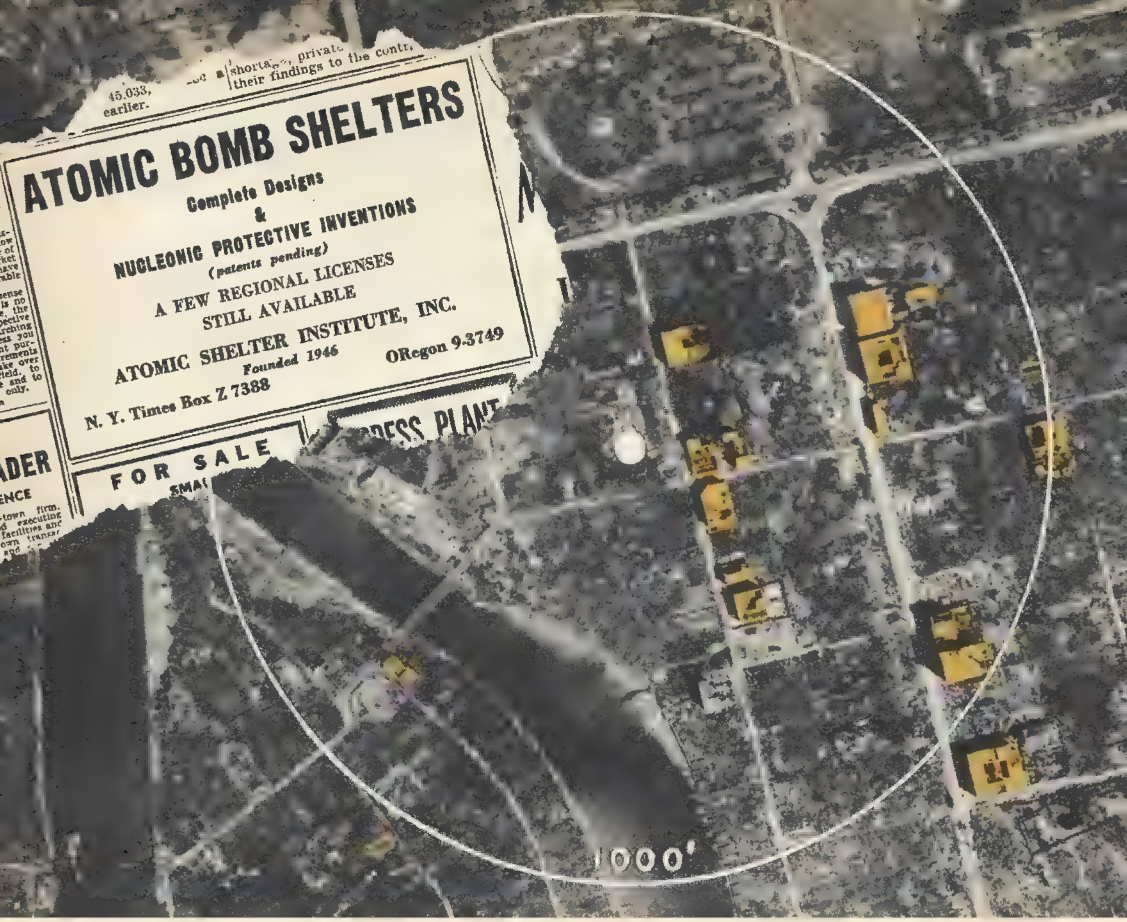
Your first impulse in the face of an atomic attack would be to run somewhere,



Hiroshima railing, above, protected the area immediately behind it from flash burns. So, if you're in the open country when an A-bomb is dropped, take cover behind nearest tree, insert.

Well-built concrete structure, below, remained standing in Hiroshima amid rubble of frailer buildings. So, if you're in the city streets when bomb falls, take cover in nearest building, insert.





ATOMIC BOMB SHELTERS
Complete Designs
&
NUCLEONIC PROTECTIVE INVENTIONS
(patents pending)
A FEW REGIONAL LICENSES
STILL AVAILABLE
ATOMIC SHELTER INSTITUTE, INC.
Founded 1946
N. Y. Times Box Z 7388
ORegon 9-3749

FOR SALE

Target area at Hiroshima was completely leveled except for a few reinforced concrete building frames. That's why American builders of A-bomb shelters concentrate on the use of thick concrete walls.

as far and as fast as possible. But it won't help—first, because you couldn't get far enough away to be any safer; second, because the resultant stampede would endanger everyone's life and impede rescue efforts by clogging roads at the very time when they should be free. How far and how fast can you go during a simple holiday traffic jam? Multiply that a thousand times and take stock.

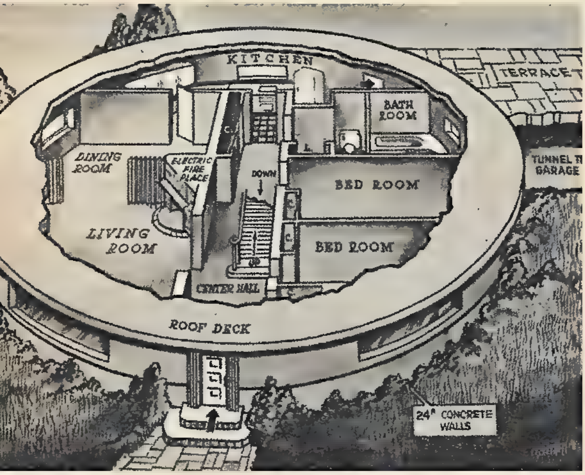
Arthur W. Wallander, former police commissioner of New York City and now director of the city's civilian defense program, told MECHANIX ILLUSTRATED "I cannot stress too strongly the importance of remaining calm. Panic and stampeding can cause more injury and damage than enemy action."

Therefore the first rule: *Do not try to run away.*

Shelters can protect you from the four deadly horsemen of the atomic bomb—blast, heat flash, gamma radiation and falling debris—if they are thick enough and far enough from the scene of the explosion.

The U. S. Strategic Bombing Survey No. 5 undertaken by the U. S. Air Force, states flatly: "The most instructive fact at Nagasaki was the survival of the few hundred people who were properly placed in tunnel shelters. Without question, shelters can protect those who get to them against anything but a direct hit."

The best protection from shock, radiation and heat is reinforced concrete; almost as good is closely packed earth. The thickness required to protect you fully depends, obviously, on the distance from the blast. How much protection and at what distances? Well many other factors influence the effect of an atomic blast, including height of the burst, direction of the blast and types of buildings in its path. The government handbook, The Effects of Atomic Weapons, estimates that at a half-mile from the explosion, a 12-inch reinforced concrete wall inside a building would provide enough protection.



Sub-basement bomb shelter, top, with reinforced concrete walls eight feet thick was recently built in California. Round A-bombproof house, above, was planned by Boston architects. Cost: $50,000.

Squat house, top, is designed as protection against atomic attack by Clarence Booth of Lakewood, N. J. He feels the thousands of tons of concrete and steel make him secure in his home-made shelter, above.

The following thicknesses of concrete or closely packed earth will prevent death by radiation:

inches of concrete	inches of earth	distance from blast
26	43	1,500 feet
22	37	2,000 feet
12	20	3,000 feet
2	3	4,000 feet

Shelters should be located in fireproof, reinforced concrete or steel frame buildings that are resistant to collapse. They should be on lower floors, in basements, halls or in the interiors. Outside shelters should be located well clear of buildings to avoid falling debris and fire.

The British government recommends construction of raid shelters on the order of the Anderson-type, built outside many British homes during the Hitler blitz. These were steel arches, six feet high and four-and-a-half feet wide, half buried in the ground. Civil defense authorities assert that if three feet of earth were piled above the arch, the shelter could protect all inside from the four main causes of death and injury.

So, the second rule: *Get to a shelter.*

Don't be in a rush to emerge from your hideout—stay there until you have been assured the bomb will not be dropped, long enough for radiation outside to wear off.

How long should you wait? Fifteen minutes after the blast there is about one-fifteenth the amount of radio activity which existed a minute after the explosion. After an hour it diminishes to one-sixtieth.

Don't get into an unreasoning panic about radioactivity. The human body can absorb a great deal of it without serious injury. Imme-

[*Continued on page* 166]

MAKE IT YOURSELF AT ZELF
ZELF TOOL & DIE WORKS

At the entrance to his machine emporium, Zelf points to an overhead sign, a slogan for many.

Make-It-Yourself Machine Shop

By Harry Kursh

THE heart of New York's crowded textile district is the last place in the world you would expect to find a farmer from Arkansas, but such is the case. Every day dozens of people ranging from engineers to shipping clerks and hobbyists walk through the doors of the Zelf Tool and Die Works at 682 Sixth Avenue for one specific purpose—to rent one of Zelf Dugal's machines.

Here it is possible for you to work with machines which never could be made available to you in any other way. Most of them you could not afford to buy. And even if you could, you probably would not have a place to install them.

At Zelf's you can buy time on one of seven engine lathes or several drill presses. You can choose from cylindrical grinders, surface grinders, bandsaws, buffers or engravers. You can rent a hydraulic press for hub sinking. Or if you just feel like experimenting you can use any one of several workbenches with all the accessories any professional machinist could hope for.

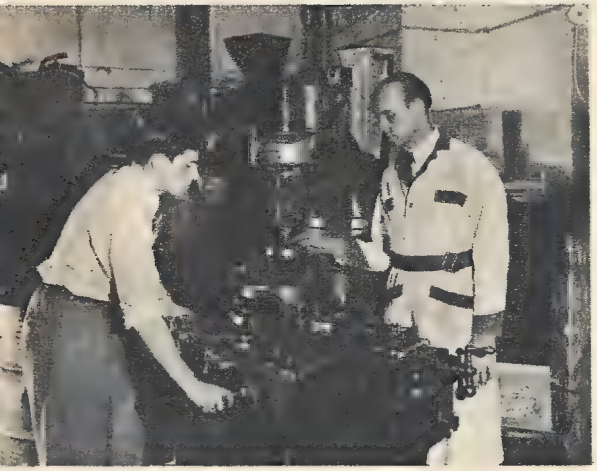
There is no minimum rate, no cover charge, no butting into what you're making. Previous experience to work on any machine is unnecessary. Instruction, advice and technical assistance, if wanted, is free. You may come in just once on a single job, like drilling a hole through a hard-steel rod, or you may come often, stay as long as you like and make the shop your office. You even can make the shop a meeting place for dates or just come down to chew the rag in its clubhouse atmosphere.

In fact, not long ago one expert machinist came in and asked if he could use the place after his regular working hours to make a little extra income. The lean and lanky 40-year-old Zelf told him to go right ahead if it would make

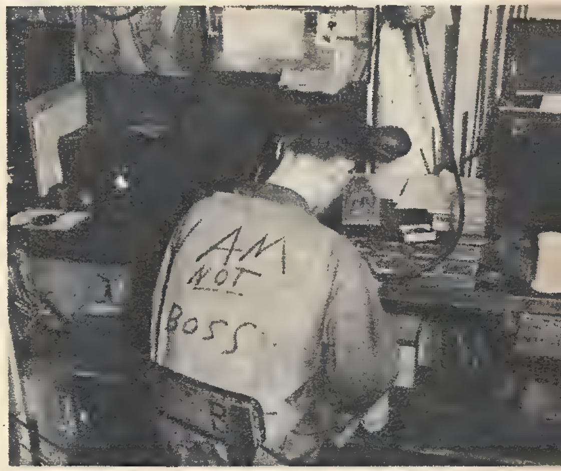
[*Continued on page* 188]

Zelf's shop occupies an area 22 feet by 70 feet. Unusually strong floor holds the heavy machines, 30 of them, with a total value of about $30,000.

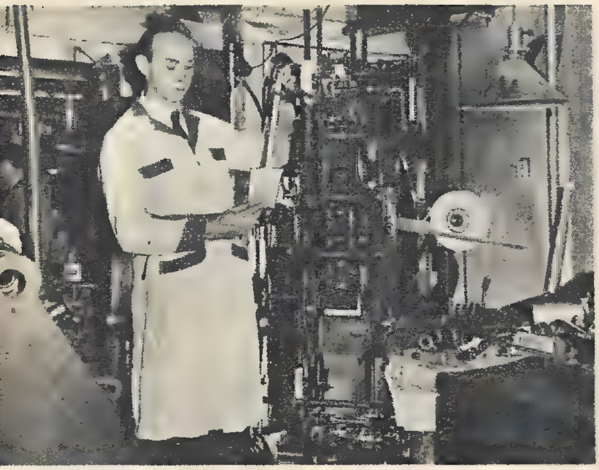
David Hirsch, professional toolmaker, gets a caliper from Zelf, seated. He makes plastic injection molds. Some of them weigh almost 500 pounds.



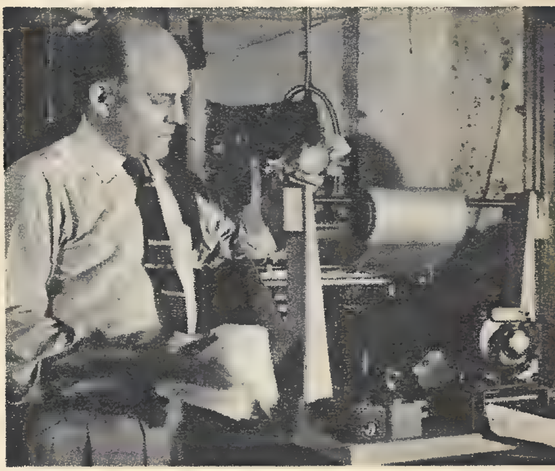
The master instructs Walter Berman in the use of vertical milling machine. Berman won't reveal his secret project. "I'm just experimenting," he says.



William Plisco works with Hirsch, above. His desk is near the shop's entrance and he wrote the notice on his back so newcomers wouldn't bother him.



James Griffin built this one-gallon tea-bag machine for Standard Brands. Its cost: $20,000.



Edward Hilker built eight of these plastic-bag making machines. He sold them for $1,075 each.

Meet Mr. Typewriter

He's also known as Martin K. Tytell, the man who can provide you with a machine in any one of 147 languages.

Илюстрована Механика

Bulgarian

Μεκάνιξ 'Ιλλουστρέητετ

Greek

Mécanique Illustrée

French

Меканикс Иллюстрэйтед

Russian

ميكا نيكس ايلو ستريتد

Arabic

Cò-giới-học Đồ-hoa

Viet Namese

Mesin Menjerangkan

Indonesian

Illustrierte Mechanik

German

Ілюстрована Механіка

Ukrainian

Ilustrirana Mehanika

Slovenian

Mechanika v obrazech

Czech

A Képes Mechanika

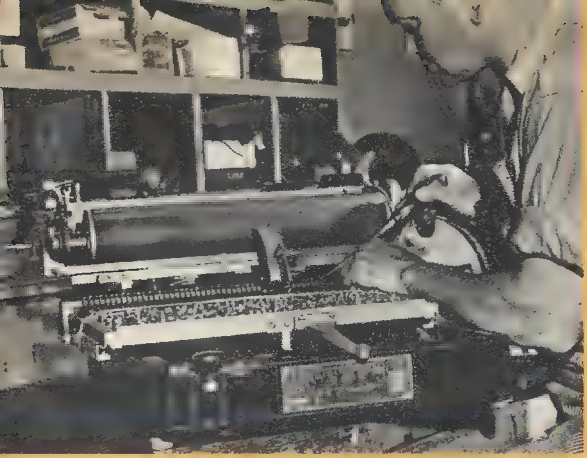
Hungarian

機械畫刊

Chinese

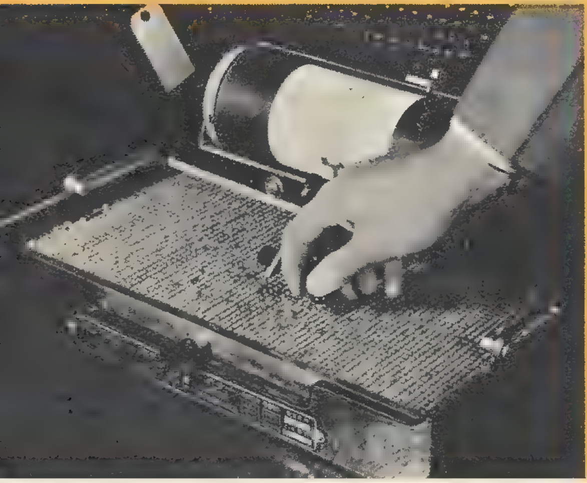
Here's Tytell himself, the world's leading typewriter man. At left is the name of your favorite magazine in different languages.

FOREIGN LANGUAGE TYPEWRITERS
UNITED NATIONS
VISITORS FROM FOREIGN LANDS:
We can furnish typewriters for rent or sale with the following keyboards:
TYTELL TYPEWRITER CO., INC.
Language Section
123 FULTON STREET,
NEW YORK 7, N. Y.



Mechanic William Ball has quite a job cut out for him with this Japanese typewriter. He must put 3,000 characters in their place on the keyboard.

This is a model of Tytell's streamlined machine which he hopes to market soon. It has a recessed space bar placed on the same level as the frame.



Japanese typewriters operate on a unique principle. You push a knob down on the character and a lever picks it up and presses it against the paper.

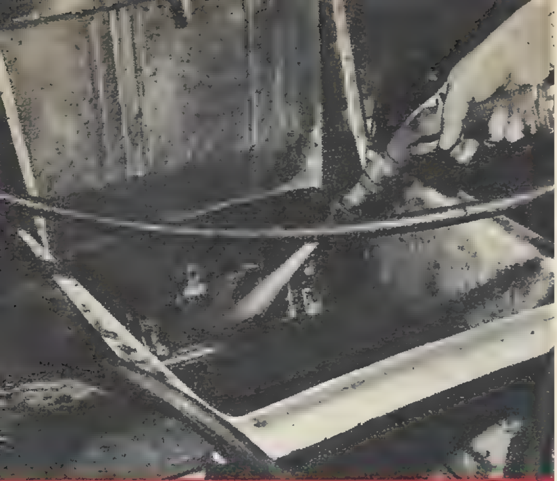
John Uyttebroek, who has worked with typewriters for 39 years, discusses a damaged Italian model with his employer Martin K. Tytell, right.

At least once a month, New York postal authorities get a letter addressed to Mr. Typewriter, New York. But they stopped consulting their directories long ago—the letters now go automatically to Martin K. Tytell. As sole owner of the Tytell Typewriter Company, he rents, buys and sells typewriters but his specialty is making a typewriter do what its manufacturers never thought it could do.

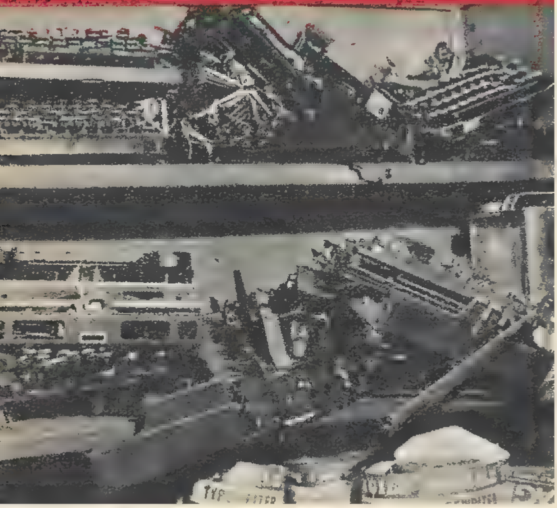
In the past decade alone Tytell has converted more than 10,000 standard keyboard typewriters into machines that can be used for 147 different languages. He is probably the only mechanic in the world who can boast of shaking hands with college professors, ambassadors, Arabian shieks, bishops and generals in one day.

Shortly after Tytell got into the business, he was paid a visit by Nazi Ambassador Franz von Papen. The monocled German spoke English and at least half a dozen other languages fluently. "The guy wanted me to fix him a typewriter that could do correspondence in German, Italian, Spanish, French and English," Tytell recalls. "But he said he was leaving the country immediately and was in a great rush. I had the machine ready for him the same day. A few weeks later we got the news about Pearl Harbor."

Since then such jobs have become merely routine for typewriter wizard Tytell. Only a few months ago Professor J. D. Edwards, of Columbia University's East Asia Institute, came to Tytell with a special problem.



When Tytell cleans his typewriters, they get a complete bath which removes all the carbon, ink and erasure refuse found on the machine.



Typewriter morgue contains skeletons of many old relics. Tytell uses portions of these machines to replace scarce parts on broken typewriters.

The professor could speak more languages than you could count on both hands and wanted to know if Tytell could get him a typewriter that could be used for half as many. Tytell took the professor's own standard American typewriter and the very next day gave it back to him with what Tytell calls an international keyboard—one that can be used for writing in 14 different tongues.

And talking about jobs, Tytell claims he is the only GI who got the right job classification in the Army during World War II. They had him fixing and repairing typewriters. But when they found out what he could really do to a keyboard, they put him in civilian clothes and for nearly half a year assigned him to top-secret projects with the OSS. He redesigned and rebuilt standard typewriters that were parachuted to underground fighters all over Europe. Many of these were used to turn out secret correspondence and psychological warfare leaflets in 17 languages. "Now I can tell you," Tytell discloses, "that every time there was about to be a new invasion, I knew where to look for it by the kind of typewriter I was asked to make up."

Today, Tytell has the closest thing to a monopoly in providing Arabic and Persian typewriters for commercial firms and government agencies with dealings in that part of the world. And now he is practically the sole provider of Hebrew typewriters for emissaries of the new Israeli Republic. Tytell also has built the only two Korean typewriters in this country. Like some of the Chinese and Japanese typewriters he has built, they are intricate contraptions that can place Oriental characters in their traditional vertical reading places. One of them is at Yale University. "But I don't think anyone up there knows how to use it yet," Tytell admits.

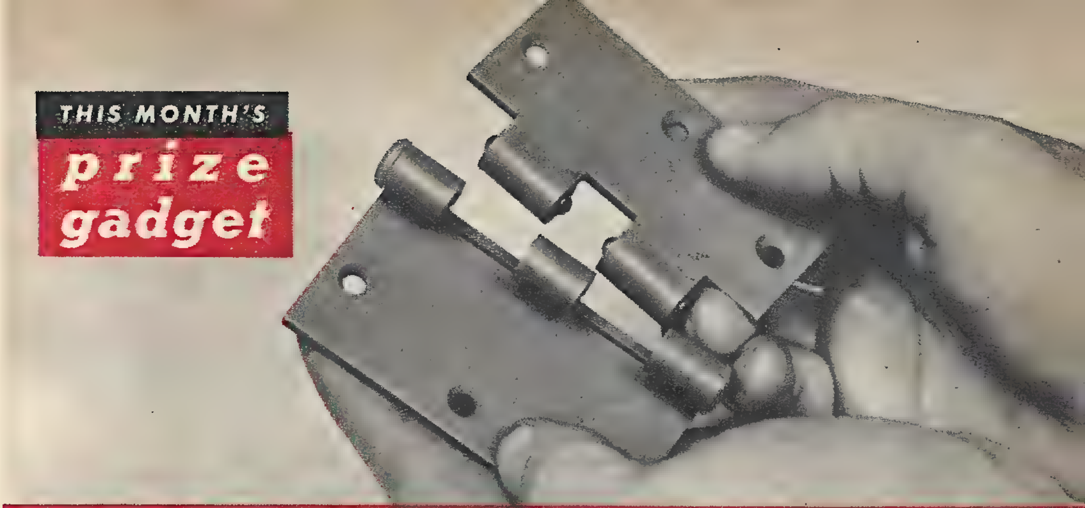
Tytell can boast of having at least one typewriter with his label in every country in the world. Many times he never sees his customers, since he gets orders by mail from every corner of the globe.

But once in a while when Tytell does see his customers, they are a source of embarrassment to him. The last time this happened a small army of FBI men surrounded the entrance to Tytell's shop and lined the two flights of stairs leading to his office. They were the advance bodyguards for a prince from Saudi Arabia. All decked out in his desert-style uniform and jewelled dagger, he came to Tytell for an Arabic typewriter. When the [*Continued on page* 190]

NORWEGIAN
SWEDISH
CZECH
GREEK

THIS MONTH'S

prize gadget



Safety Door Hinge

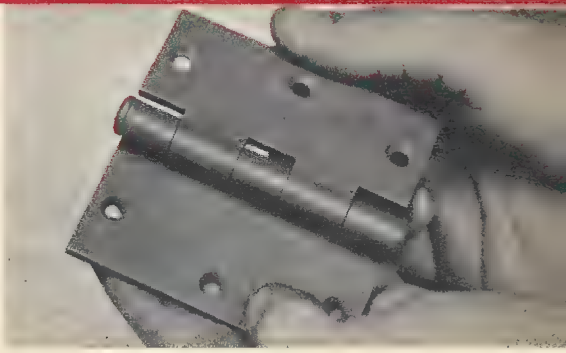
[illegible] pins in place of [illegible] hinge pin are the secret of snap-apart hinges.

"DADDY, Daddy!" muffled cries reached Warner Steinbach, a business man of Cranford, N. J. just as he was settling down to the evening paper after a hard day's work. There was a desperate quality in those sobs, so he raced to the scene. Water was spilling from underneath the bathroom door which he found was locked from the inside.

"I can't turn the key and the tap won't close either," wailed his youngest daughter. Clearly there was but one thing to do. Steinbach gave the door the old heave-ho. Finally it splintered and he carried the little girl to safety.

That was many years ago but Steinbach never forgot the experience. Hearing of similar episodes in other households, he invented the Safety Hinge for just such emergencies. Safety Hinge-equipped doors require only a sharp push on the joint side to open. To replace the door, you just tap the hinge back into place.

And thereby hinges this month's $50 prize gadget award. •



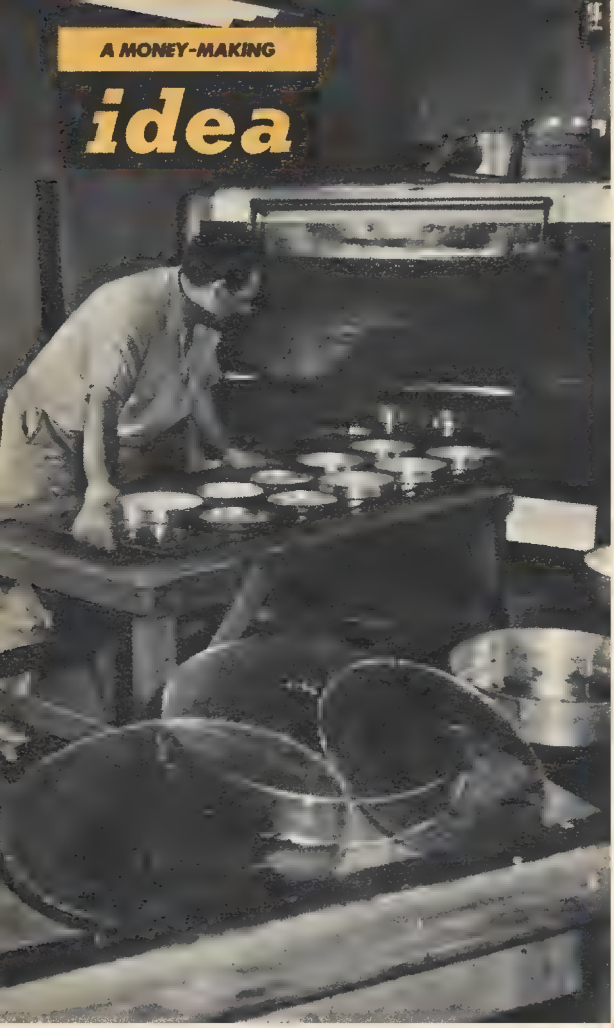
Warner Steinbach, below, turned a frightening experience into a well-paying proposition by inventing and manufacturing a new device that permits instant opening of doors in emergencies.

WIN $50

If you're a whiz in the workshop, or even a run-of-the-bench craftsman, chances are you've got a pet-gadget project on your mind. Well, when you've got it perfected, send pictures and description to Gadget Editor, Mechanix Illustrated, 67 W. 44 St., New York 18, N. Y. The best entry each month in the opinion of MI's editors will be given a Prize Gadget cash award of $50.

A MONEY-MAKING

idea



He's a Plastic Baker

Somebody forgot to tell Spencer Smilie that it couldn't be done. So he went on cooking plastics and developed a recipe for fortune.

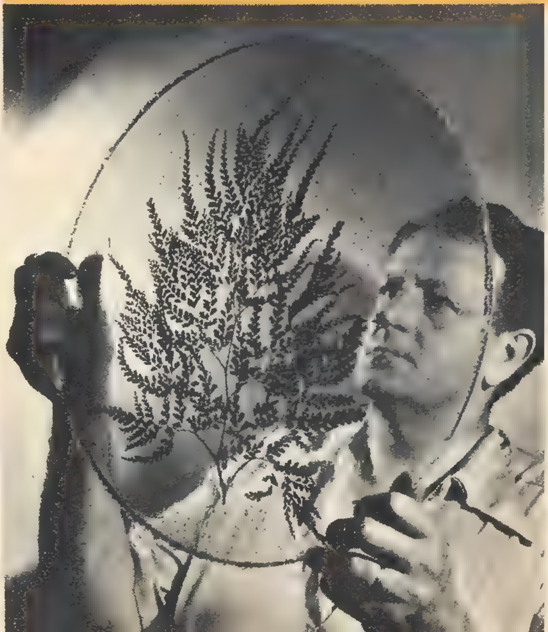
By Louis Hochman

Like a baker, Smilie pushes into the oven ordinary pie tins which serve as molds. In the foreground are finished plastic sheets.

IF Spencer Smilie of Beverly Hills, Calif., had studied chemistry and physics, he might still be plodding along at his job in a plastics factory. But, unhampered by sound scientific know-how and not realizing how impossible it was supposed to be to fuse incompatible combinations of plastics, Smilie solved an unsolvable problem. Today his plastics art business—the only one of its kind in the world—is worth a small fortune.

It all started about three years ago when Smilie was working in a plastics plant where a dazzling variety of colorful plastics fired his imagination with ideas for original buttons and pins. To other workers in the plant the last trickle of plastic that fell from the extrusion machines when they were shut off at the end of the day was just so much waste. To the artistic eye of Spencer Smilie, however, these bits of waste which oozed and hardened into an infinite variety of twisting swirls and curves, were things

Beautiful flowers and leaf formations are preserved indefinitely in Smilie's plastic sheets. Note thousands of tiny bubbles in the plastic.



of beauty and unusual modern design.

One night he took one of these drippings home, trimmed off some rough edges and stray ends, cemented a pin to its back and presented it to his wife as a brooch. Before he knew it he found himself in a small sideline business, selling these remodeled waste products to others.

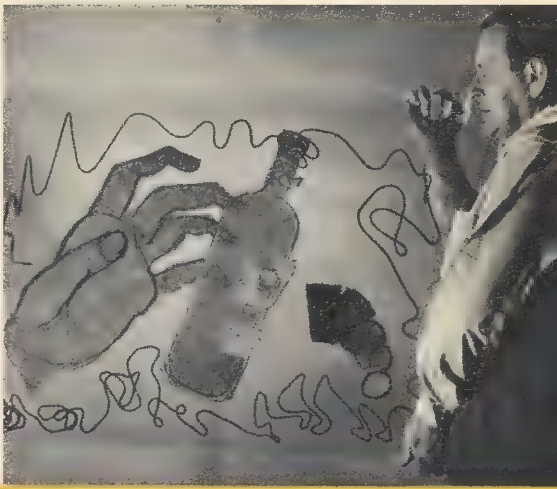
Soon, Smilie's daily practice of taking home a suitcase full of waste drippings aroused his boss' curiosity but Smilie refused to divulge his newly-found use for the discarded plastic. The boss then tried to charge him for the waste whereupon Smilie quit.

By this time he was deep in experiments, mixing various combinations of plastics and baking them in the family oven. But it was eight months before he had anything worth keeping. By that time the oven itself wasn't worth keeping.

As molds he used small tin-can covers and flat cups made from thin slices of brass and copper pipe and embedded all sorts of flora, fauna, insect life and odd objects in his new plastic. These he made into unique and distinctive buttons, pins and earrings and wholesaled them at from 25c to $1.25 each.

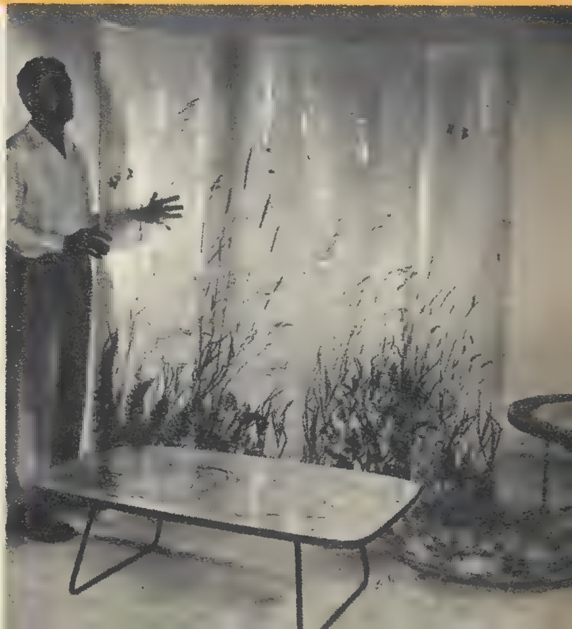
In a short time, Hollywood dress designers and manufacturers were swamping the Smilies with orders. From people all over the country came requests for buttons with such bits of personal treasure encased in them as a lock of hair, a tiny bloom from a home garden, [*Continued on page* 190]

Mural depicting a hand reaching for a bottle was done for psychiatrist's office. It took much planning, above, to complete the work of art, below.

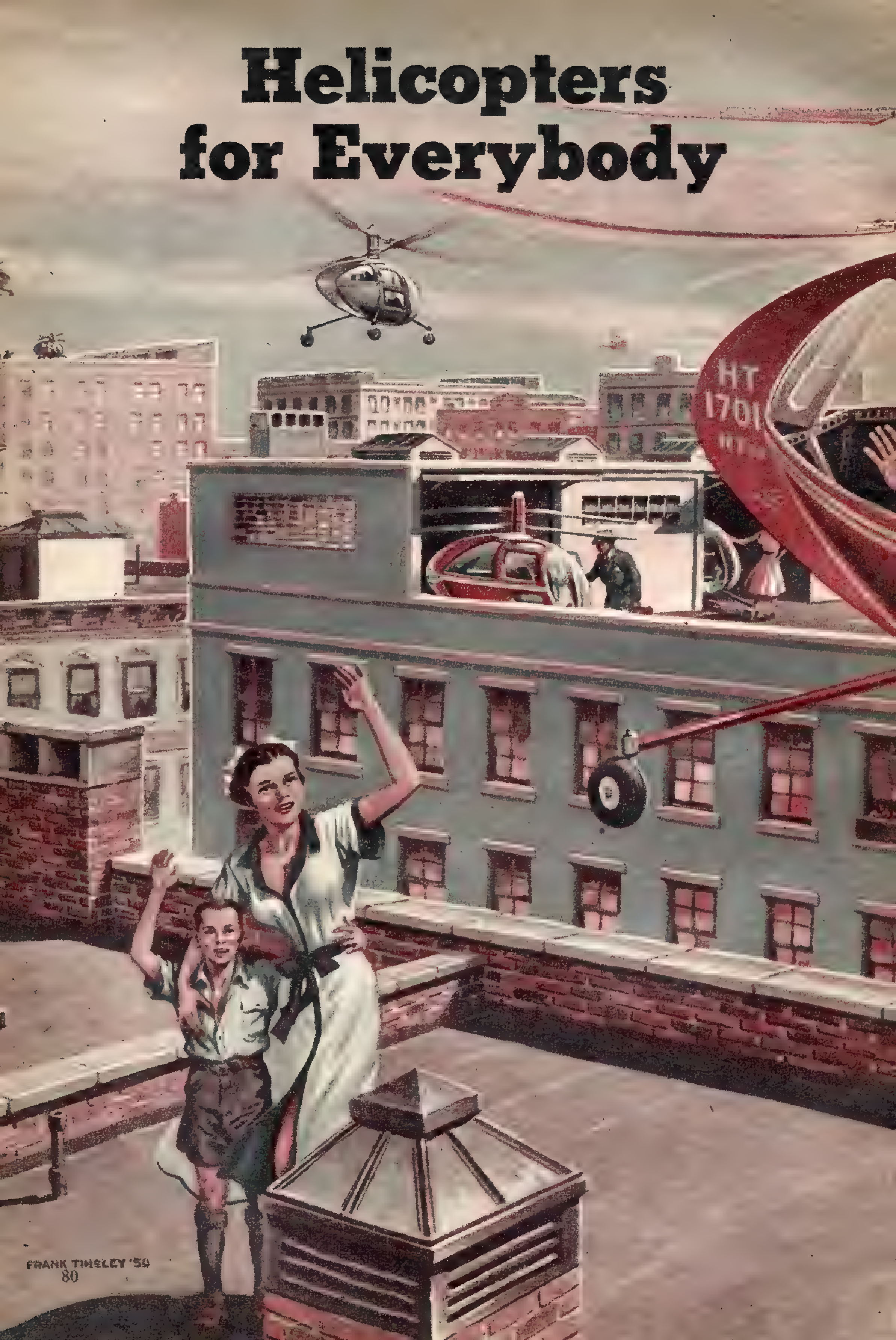


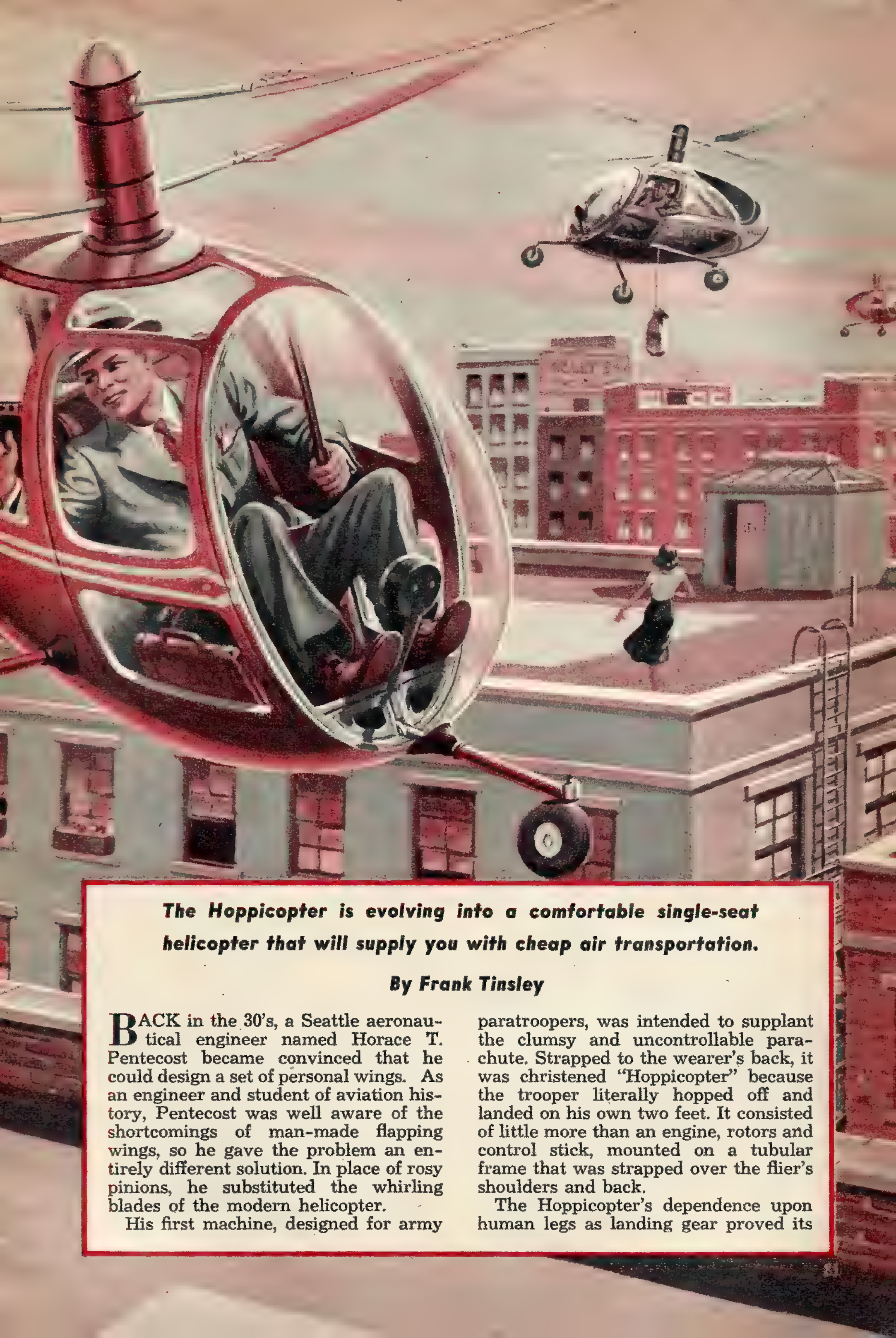
Sheet of half-baked plastic is laid over leaves in a pan mold prior to baking. Leaves are later scraped off, revealing impression on back of sheet.

Lifelike Smilite screen, below, which contains assorted plants and butterflies, stands in back of coffee table with yarn design and leaf bowl.



Helicopters for Everybody


HT
1701
FRANK TINSLEY '50



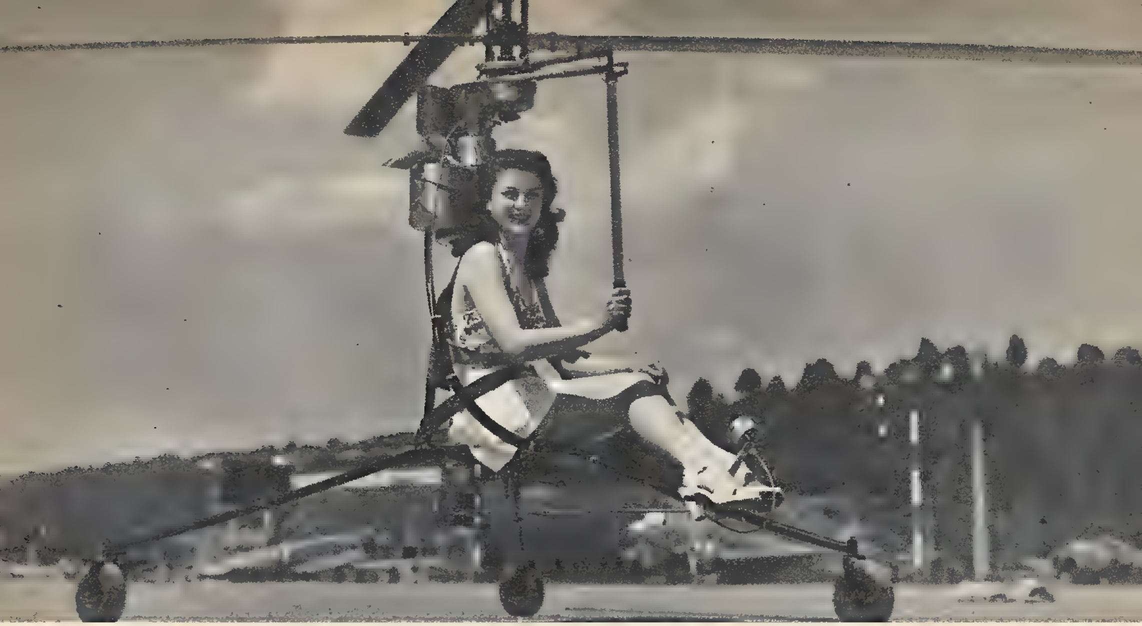
The Hoppicopter is evolving into a comfortable single-seat helicopter that will supply you with cheap air transportation.

By Frank Tinsley

BACK in the 30's, a Seattle aeronautical engineer named Horace T. Pentecost became convinced that he could design a set of personal wings. As an engineer and student of aviation history, Pentecost was well aware of the shortcomings of man-made flapping wings, so he gave the problem an entirely different solution. In place of rosy pinions, he substituted the whirling blades of the modern helicopter.

His first machine, designed for army paratroopers, was intended to supplant the clumsy and uncontrollable parachute. Strapped to the wearer's back, it was christened "Hoppicopter" because the trooper literally hopped off and landed on his own two feet. It consisted of little more than an engine, rotors and control stick, mounted on a tubular frame that was strapped over the flier's shoulders and back.

The Hoppicopter's dependence upon human legs as landing gear proved its



Second version of the Hoppicopter design had a tripod landing gear with motor mounted behind the pilot's head. It was better than the original "back strap" model but weight distribution was unsatisfactory.

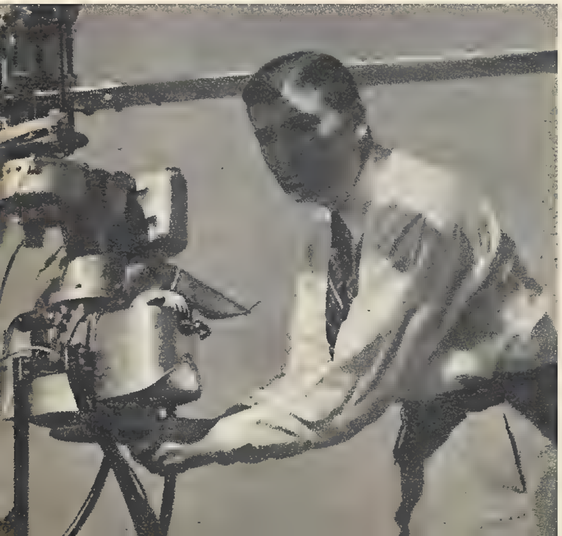
ultimate undoing. Landing on rough terrain, the wearers frequently stumbled and fell, smashing the whirling vanes against the ground. This was not only embarrassing but expensive.

The next model boasted a light tube-and-canvas seat and three landing wheels arranged in a triangle, supported on spindly, insect-like legs. In flight, the pilot felt somewhat more at ease, not as though he were hanging in space like a fish on the end of a line. The working parts were unchanged, however. A hot, noisy motor still nestled coyly against the back of the pilot's neck. The gas tank was suspended directly above him with no fire protection.

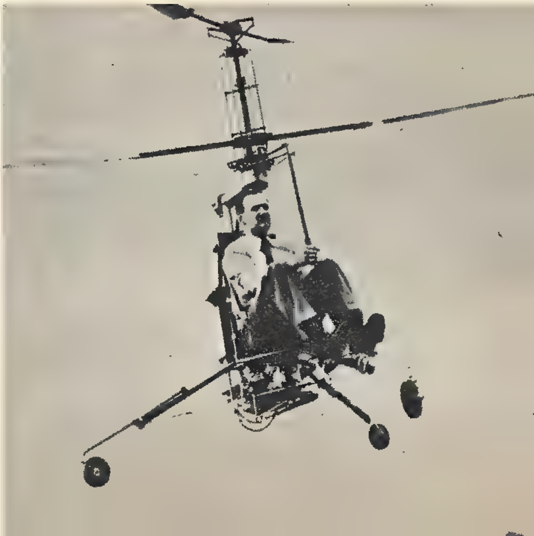
The third model has corrected some of the above mentioned faults. The engine now is slung under the seat directly beneath the center of gravity. This warms the pilot in cold air and improves the machine's balance. The model at present is being tested. There still remains, however, the sense of insecurity—of riding a flying swivel chair with no visible means of support. Pentecost and his associates are perfectly well aware of this natural reaction and have planned a weatherproof enclosure for the machine.

In the illustration one version of such a streamlined housing is shown. With this addition, our Hoppicopter becomes a vehicle of true utility. Such a machine would be practical, cheap to buy and maintain and could easily be the answer to the demand for a "Model T" helicopter. •

Pentecost prepares to start his engine by spinning it with a starter cord in the flywheel's base.



Present model, the third, has the engine situated under the pilot's seat. This gives it better stability.

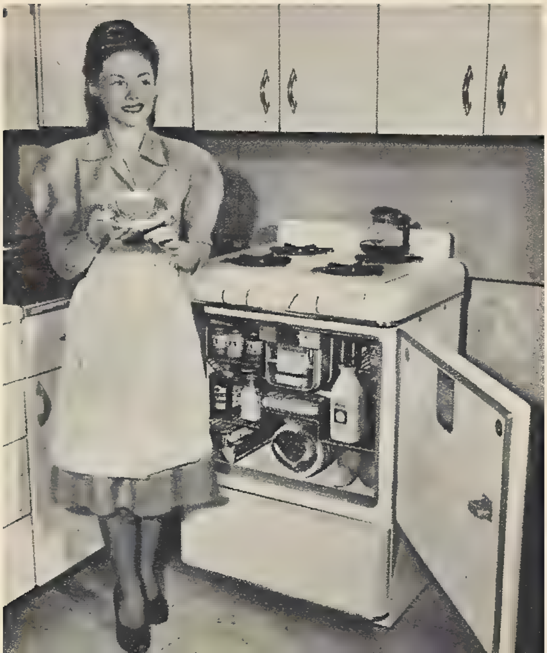


Springless Mattress, dreamed up by a Swedish inventor, is light, bouncy as innerspring types. It's been tested for durability, is said to have orthopedic values. Secret is the core of air-filled plastic. Susquehanna Mills, N. Y. C.

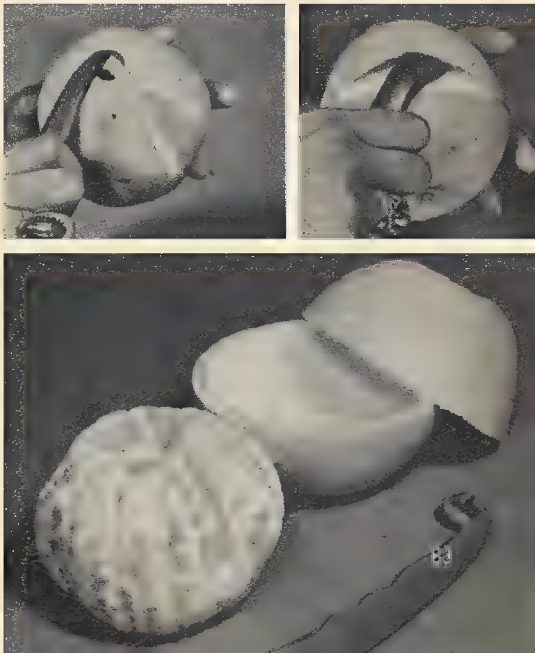
Damp-Champ Super takes the backache out of laundry days. The plastic bag holds two machine loads of wash, leaves hands free. For dampening clothes evenly, just add some water and seal bag. Humphrey-Callander, Clinton, Ill.

NEW for the HOME

Range-Refrigerator, all in one, is a dollar and space-saver for small apartments. This one features a four cubic-foot electric refrigerator, gas cooking top. All-electric models also are available. General Air Conditioning Corp., Los Angeles.



Orange Peeler does a neat job of undressing citrus fruit. First, you cut a groove around the center. Second, you reverse the plastic gadget and use the curved blade to work the peel loose, as shown. Dillon-Beck Mfg. Co., Hillside, N. J.



ON THE COVER

MECHANIX ILLUSTRATED
15¢

Beautiful Lisa Ferraday inspects MI's cover car with our not-so-beautiful Tom McCahill. The car? It's an $18,500 custom Cadillac designed by Saoutchik.

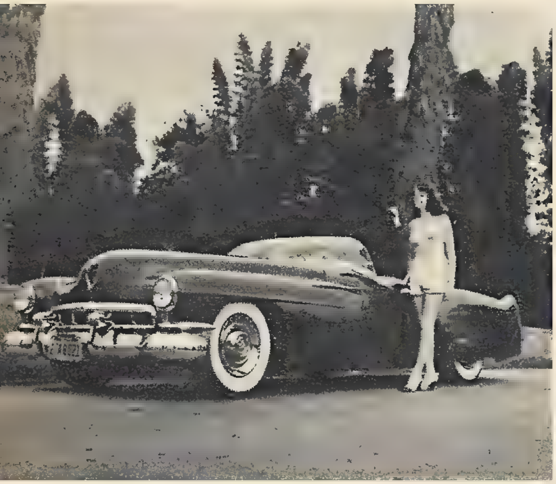
CUSTOM CARS....

"JUDGE a man by the company he keeps" is a proverb which has managed to survive the years. But nowadays you can substitute "the car he keeps" and still be on the right track.

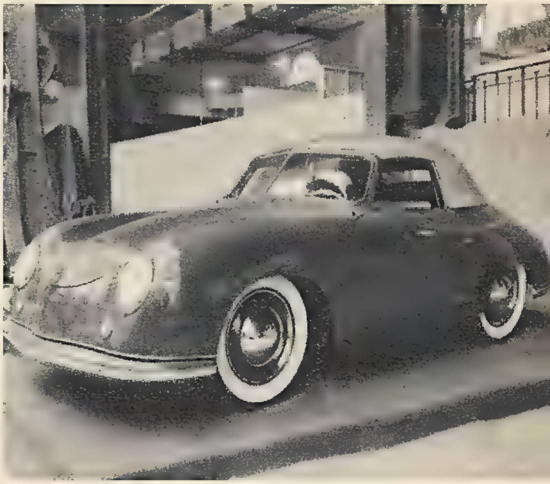
For more and more motorists are getting bored with the production-line beauty and middle-class standard performance of our stock cars. And more and more of them—are actually doing something about it.

What are they doing? Well, the next time you take a spin down Lincoln Highway, take a good look at the cars that whiz by. You'll be startled to realize the high percentage of unusual vehicles. For America's auto enthusiasts are buying and building custom cars and hot rods as never before.

These special jobs reflect not only the individuality of their owners but the basic individuality of America. •

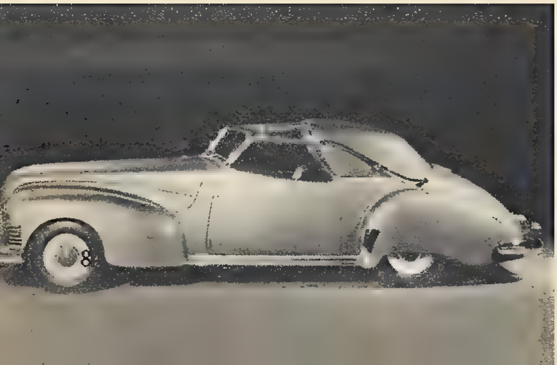


Lon Hurley built this $8,000 dream car in eight months. Hood, grille and fenders are Cadillac parts while rear deck and doors are original design.

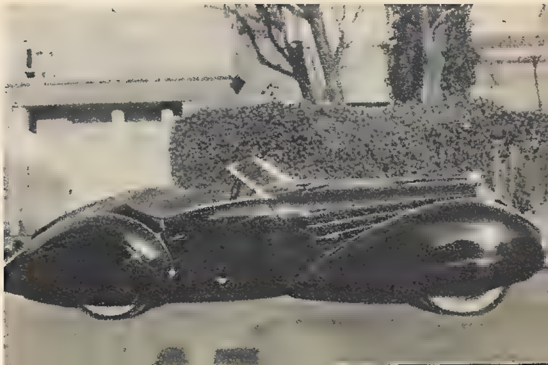


Small German auto which looks like a racing car is called the Porsche. It has a four-cylinder engine in the rear of the two-seater coupe body.

This Packard model never got past the experimental stage. Built to make over 125 mph, it represents an investment of more than $200,000.



Built in 1939, this French custom car has a body designed by Figoni & Falaschi and a Delahaye V-12 chassis. Owner says it can make over 115 mph.



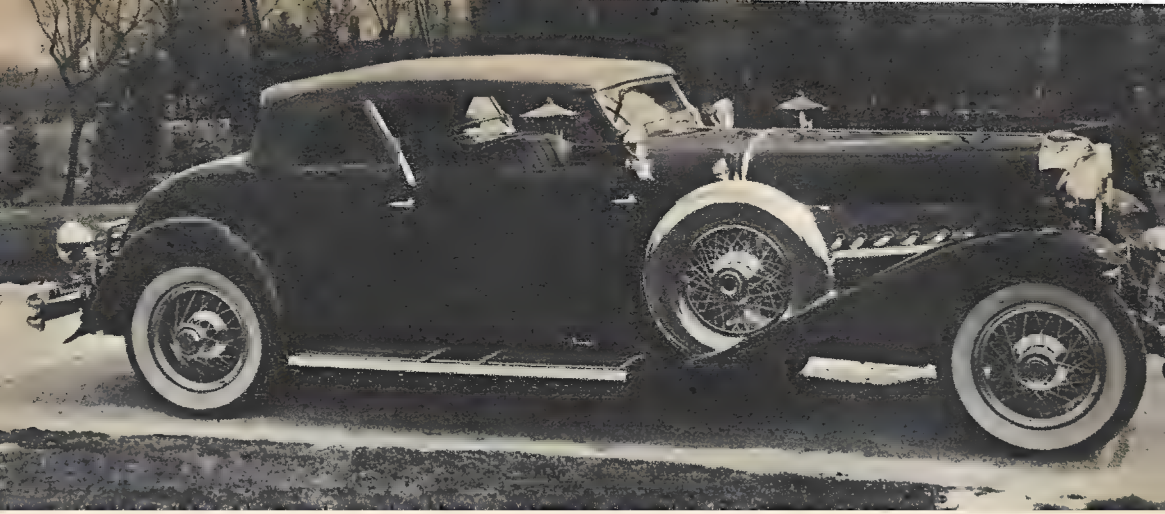
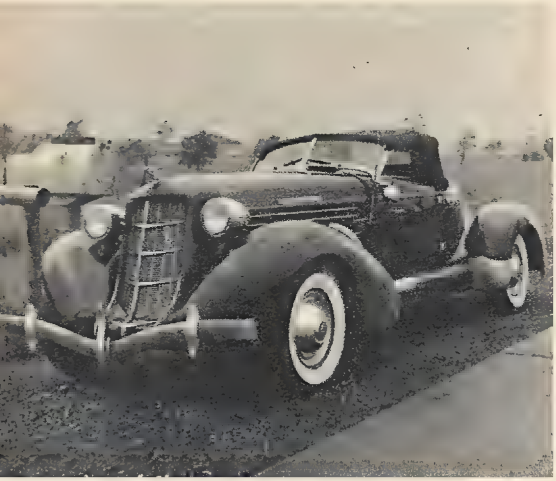


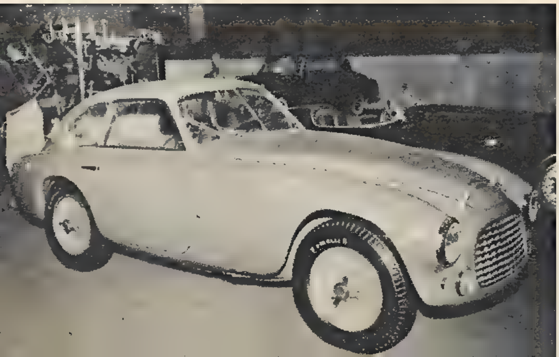
Photo courtesy Sherley Mitchell

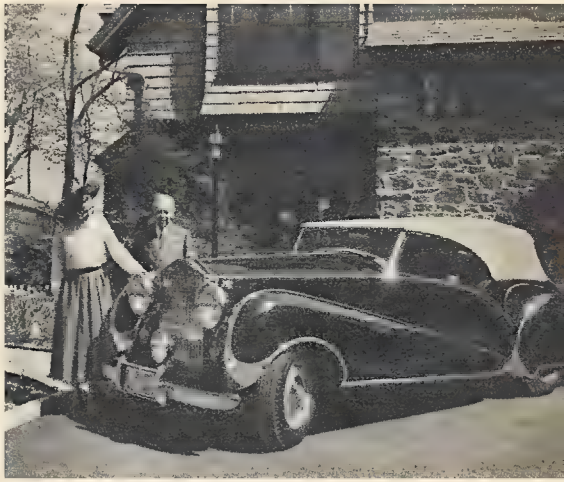
This 17-year-old double-cowl Duesenberg phaeton is a supercharged show model with a body which was specially built by Brunn of Buffalo, N. Y. It was later listed and sold as a 1934 model.



One of the classic cars of the 1930's, this Auburn super-charged speedster can make over 100 mph—and there's a plaque on dashboard to prove it.

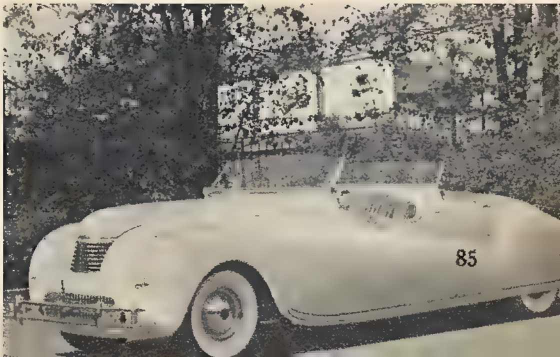
Recent motor show in Paris displayed this Superleggera Ferrari, a long nosed Italian car. It's only a two-seater although it has a sports coupe body.



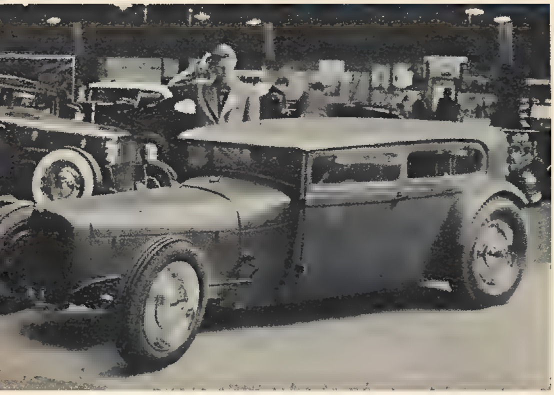


J. S. Inskip of New York just built this Rolls-Royce Silver Wraith (late model) for Tommy Manville and wife, shown with him. Price tag was $22,500.

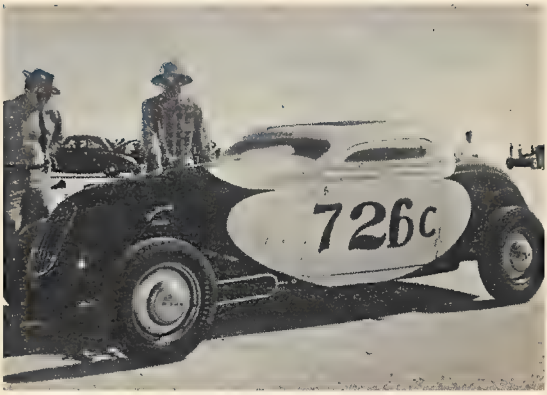
Le Baron of Detroit built the body of this Chrysler Newport in 1939. It has a wide separation between the front and the back seat and sold for $25,000.



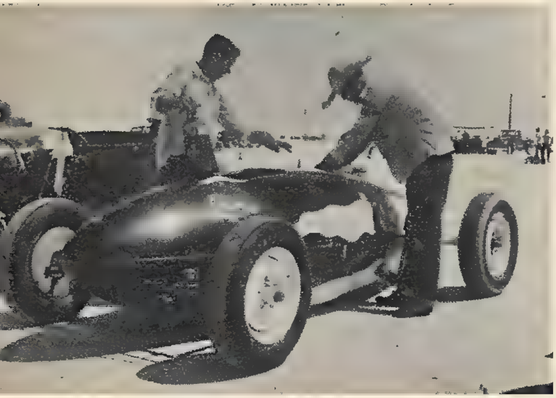
....HOT RODS



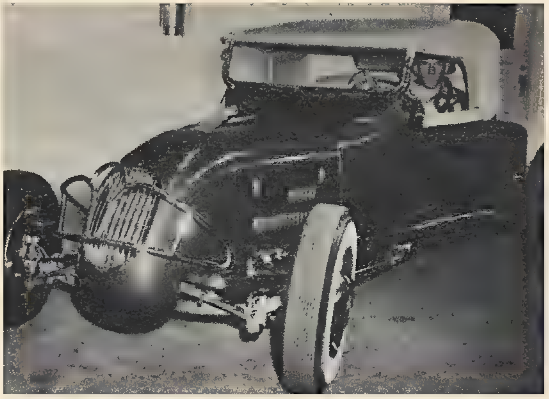
This beauty, built as a gag by Noble Heuter, has made 112 mph. It's a 1929 Model A Ford body with roof chopped off and rear fender retained for laughs.



Bob Pierson's chopped off '34 Ford coupe with a '46 Mercury engine is probably the fastest coupe in the world. It holds Bonneville record of 142.98 mph.

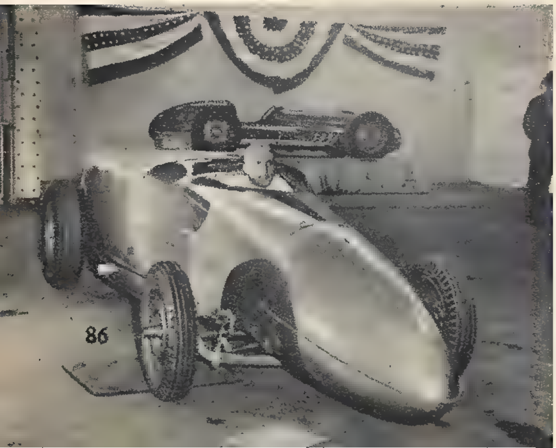


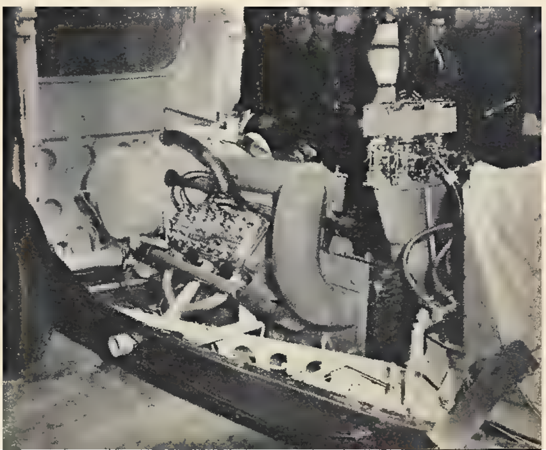
Evans special, a Class C Lakester, placed second recently in the Bonneville National Speed trials. The little belly-tank hot rod made 174.75 mph.



Only the top was built to order on Les Callahan's '22 Dodge body set on a '32 Ford frame. The car has regular Ford axles and a '46 Mercury engine.

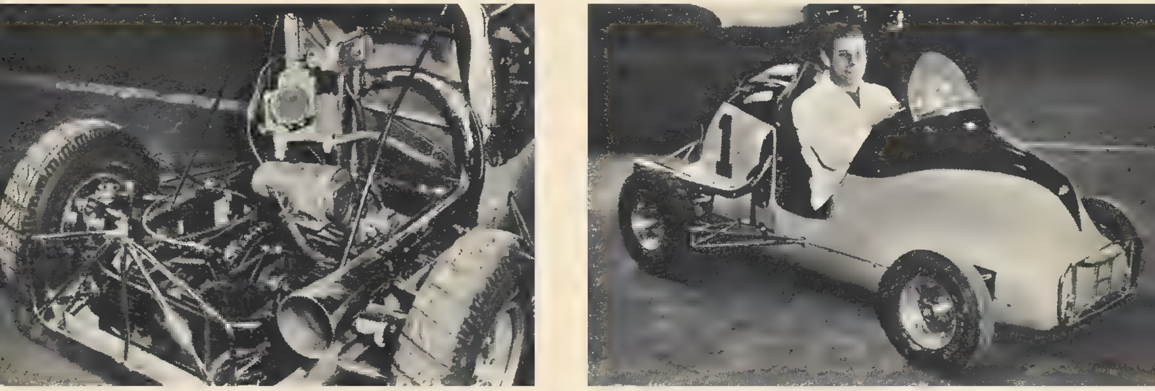
Ant Eater, which has been called the world's faster roadster, was clocked at 152.54 mph. The entire body swings up on hinges to expose the engine and cockpit, below right. Belly-tank nose seats the driver, below left, while the 268 cubic inch modified Mercury power plant is located in the rear.



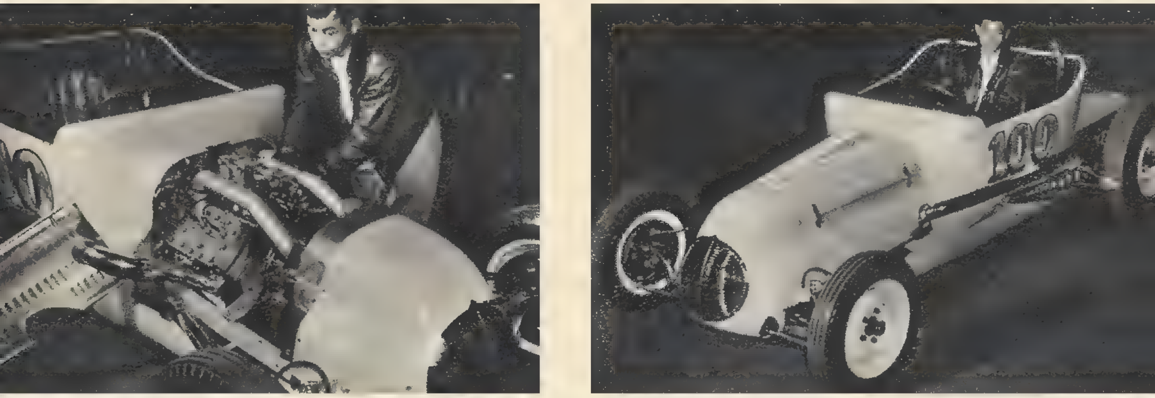


ON THE COVER

Carash Custom is a '36 Plymouth with a Ford rear and a modified '32 Cadillac V-16 motor. It's hand-made from sheet steel over tubular framework.



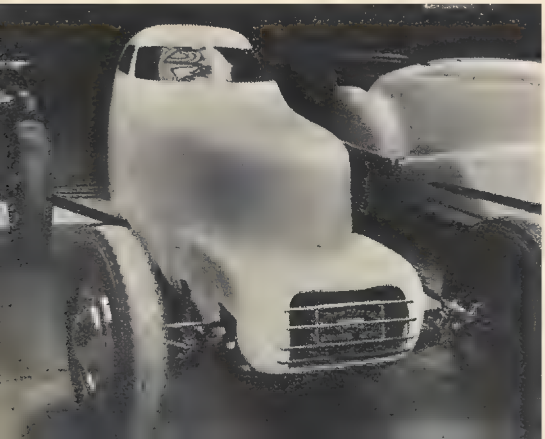
Three-quarter midget car built by Bob Feuerhelm has an all-plastic body and a motorcycle J.A.P. 30.50 cubic-inch rear engine, seen at left. Association which regulates three-quarter midget races specifies that all entrants must agree to sell cars for $2,000 in order to keep investment down.

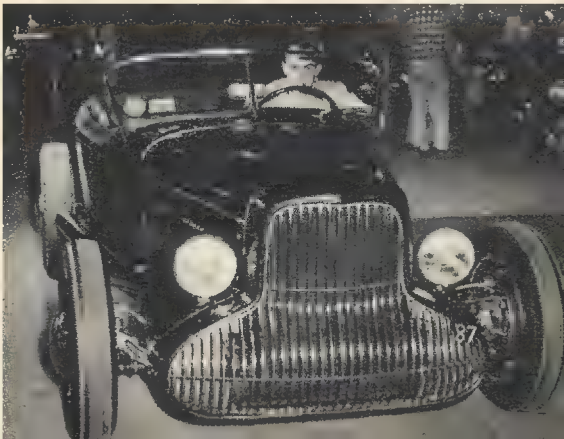


Yellow racer built by Fred Ige has a '25 Model T Ford body and frame, a '28 Hudson axle and a '41 Mercury motor, shown at left. The car is all hand-made with aluminum shell and grille, full belly pan, bucket seat upholstered in plastic, louvered hood, Ross steering wheel and safety hubs on the wheels.

Screwdriver, a hand built streamliner owned by Bob Arner of Culver City, Calif., has had many motors in it—now a '45 Mercury. It's done 139 mph.

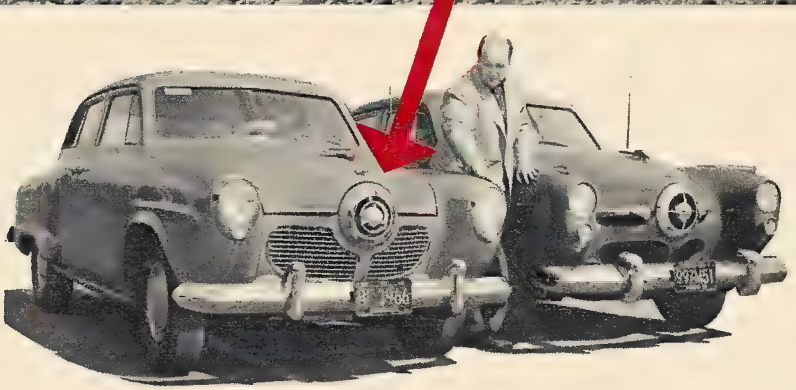
Designed by American GI Pat Leighton in a Jap prison camp, this '32 Ford channeled roadster with a '42 Mercury engine has made 117.64 mph.





MI Tests the '51 Studebakers

A V-8 overhead-valve engine is the big news at Studie this year and our expert Tom McCahill finds it is very welcome news indeed.



A flat skid at 55 mph, top, nearly wrecked Tom and a 1951 Champion convertible (see story). Main change in appearance this year is redesigned spinner (arrow).

NOTRE Dame's Frank Leahy and his Hoosierized Hibernians used to be the front page items around South Bend, Indiana, but as of now the big news coming out of that city is the Studebaker 120-horsepower V-8 valve-in-head engine. This power plant transforms the maidenly Studie of recent years into a rip-roaring, hell-for-leather performer that can belt the starch out of practically every other American car on the road. And do it with much less effort than it took Purdue's football club to dump the Irish out of the undefeated class.

Studebaker was the original notch-back kid, the only old-line automobile manufacturer since V-J Day to give us a radically different body design. Now, barring another war, we Americans are about to get the post-war cars all the builders promised but never produced so long as they could get away with passing off grille changes, super-blooper balloon tires and chubbier silhouettes as "sensational improvements."

Ninety per cent of the engines in new American cars being sold today were designed and first introduced when your old man was spiking his near beer with rubbing alcohol, Babe Ruth was the Sultan of Swat and Max Baer was getting ready to cop the heavyweight crown from Primo Carnera. In short, nine out of ten new cars sold since the war are powered with engines that are, from a design standpoint, old enough to vote.

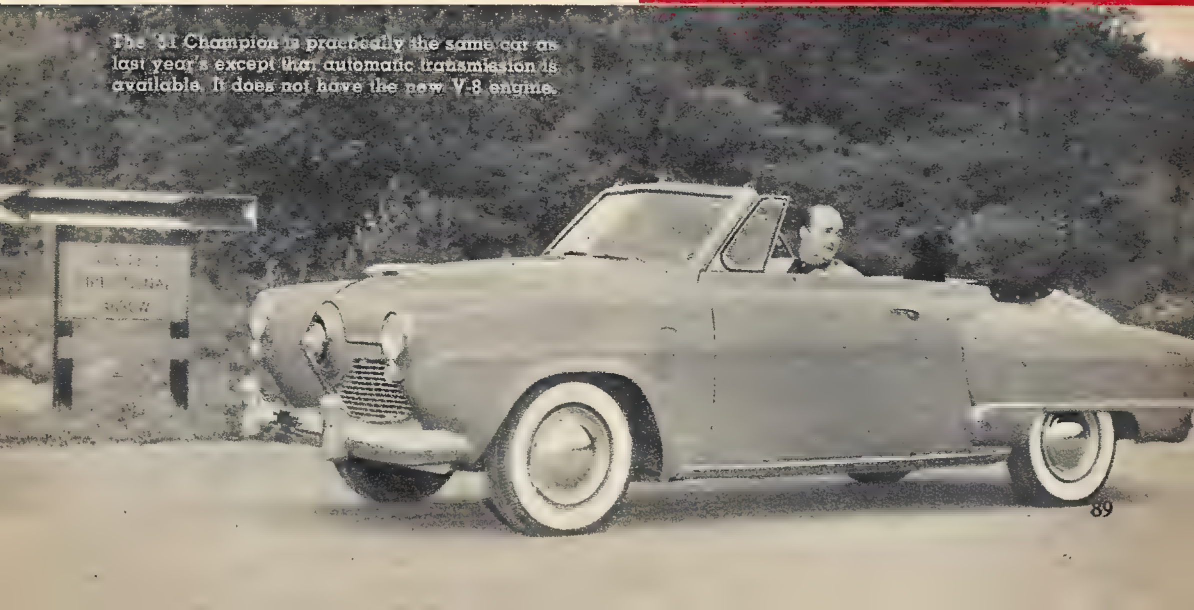
A little over two years ago Cadillac and Oldsmobile broke the ice with something really new in engine design. These power plants, to which Studebaker's can now be added, are the finest and most efficient in the history of our automobile industry. For instance, the Cadillac's 160-horsepower engine, developing more than 300 foot-pounds of torque, has to push a much heavier body and chassis than any of the Big Three small cars—yet it gives much better gas mileage than any of them. That's *really* improved engine design for you and, believe me, it's long overdue.

Before we get into Studebaker's new V-8, let's take a look at the V-type situation as a whole. I've read lots of letters in the past from readers who told me that V-type power plants were no good. Of course, many of these well-meaning guys had never owned a V-engine but somewhere they had heard that the cylinders were egg-shaped, the blocks had a tendency to pull apart, and a number of other equally silly and false rumors. Well, if they knew nothing else the Germans, and particularly Mercedes, knew how to build great sports and road-racing cars. And all the really hot Mercedes race cars had V-type engines.

Actually, most good engine men feel that the four-cylinder, overhead-valve-and-cam engine is the finest from the standpoint of [*Continued on page* 161]

Inside the bonnet of a new Commander, Uncle Tom finds the 120-hp power plant which makes the '51 line of cars "rip-roaring" performers."

On cars equipped with automatic transmission Studebaker has widened the brake pedal, thus letting the driver operate it with either foot.

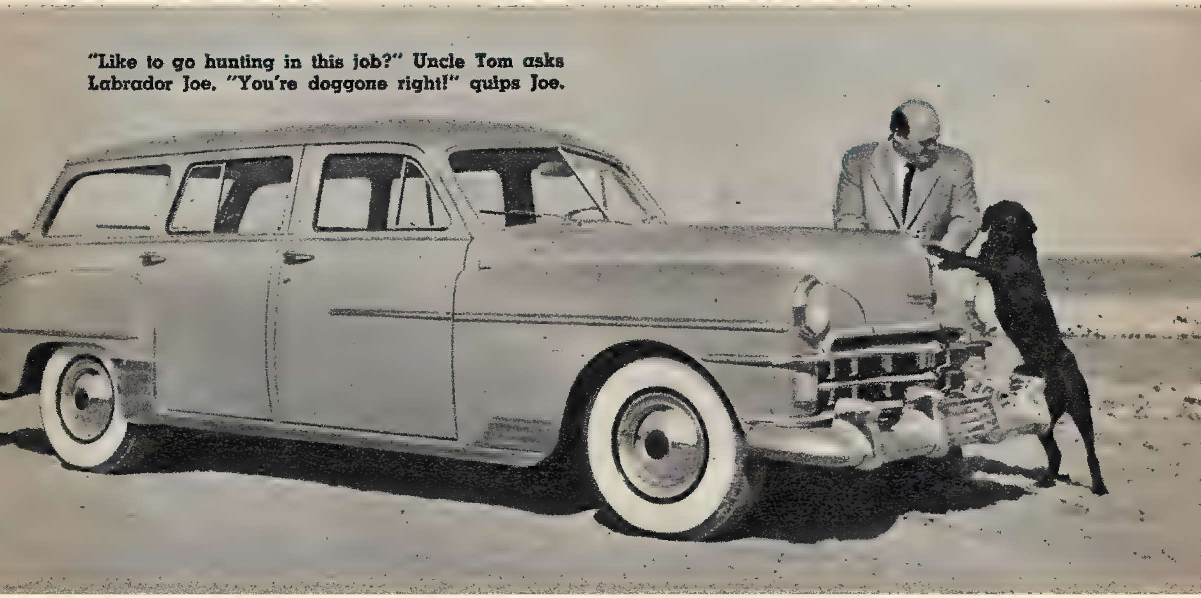


The '51 Champion is practically the same car as last year's except that automatic transmission is available. It does not have the new V-8 engine.

McCahill Drives the CHRYSLER Station Wagon

MI's auto expert finds the Town and Country all-steel wagon a really luxurious equipage.

"Like to go hunting in this job?" Uncle Tom asks Labrador Joe. "You're doggone right!" quips Joe.

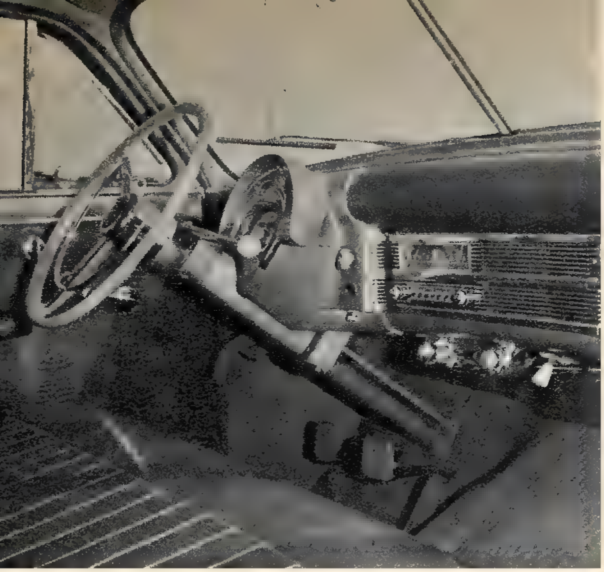


IF you are entertaining any thoughts of joining Lord and Lady Marmaduke Mousetail for an upland game drive in the near future, the Chrysler Town and Country all-steel wagon is definitely the barge to turn up in. I can picture Lord Mousetail's face now as you step down from this luxurious trap with your deer stalker's hat at the correct Sherlock Holmes angle.

"Gad!" old Mousetail may very well exclaim, "what a vehicle for the brush and bear!" Or, mayhap, if he is in a pettish mood, "Begone, varlet—groceries are delivered at the service entrance!"

Some months ago (April 1950 MI) we brought you a report on the Plymouth all-metal Suburban that I drove to Florida and back. We stated at the time that this was the hottest station wagon buy in the country and that undoubtedly Chrysler's plushier offerings would practically rip the hinges off kid brother Plymouth's box of marbles, trying to get into the act. Well, now we have the Town and Country version and a more luxurious utility wagon never rolled over the highways.

Like the Plymouth, this new job is all-steel and offers the same features on a much larger and more expensive scale. For instance, on the rig I took out to test, the imitation alligator plastic upholstery was so real looking you could almost smell the Everglades and hear Little Black Sambo whistling Bongo on the Congo. This is the



Interior appointments of the Town and Country are as well finished as those of many limousines.

Starboard-pointing tail pipe diverts the exhaust fumes well away from the car, preventing "seasickness."

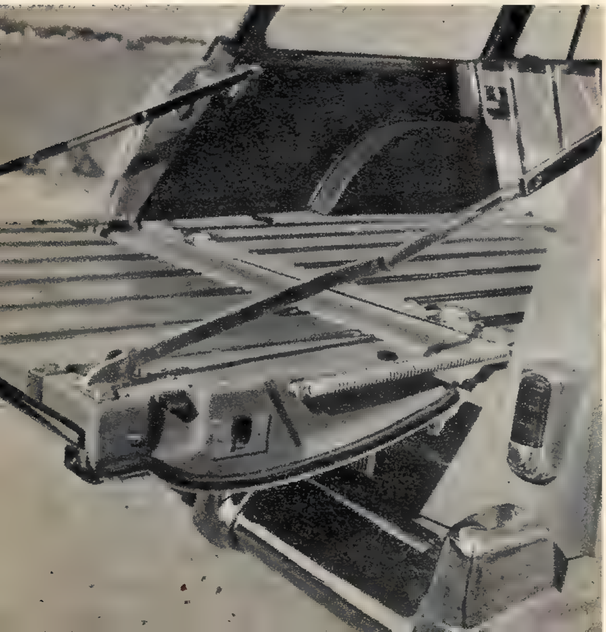
Plymouth Suburban blown up to vast size, but dignified, like a guy in an expensive blue serge suit. Before working up any more enthusiasm, however, let me drop you gently on your head by mentioning the price. Three thousand fish *plus* is what you must have in your grimy fist before the man says, "Take her, Jackson, she's yours." (Okay, all you bookmakers and politicians —now that we're alone, let's get on with the pitch.)

One day Ken Purdy, or some other Boswell of the automotive business, will work up a treatise on how the high-society station wagon evolved from a horse-drawn buckboard whose original function was to serve as a low-society combination manure spreader and sheep dip inspection table. I don't have the facts at hand but I'll take a wild swing and guess that maybe old Henry Ford the Original started this motorized buckboard stuff with his first Model T station wagon.

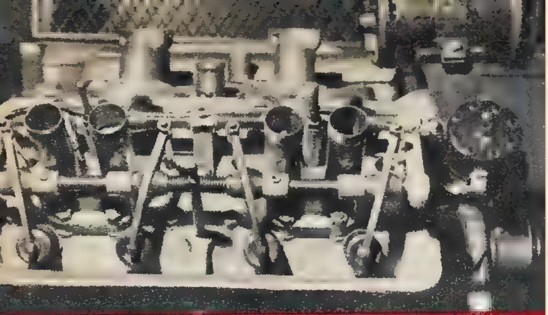
Anyway, my uncle Charlie's Model T station wagon, which I Joie Chitwooded through a hay stack that had some silly poles in the middle, was the first one I remember. It so happens I can recall the outcome of that ride rather clearly. When it was over, Uncle Charlie's wagon looked like a short-legged horse with its mouth full of hay.

[*Continued on page* 172]

Massive, strongly-reinforced tail gate is almost husky enough to support a horse, McCahill finds.

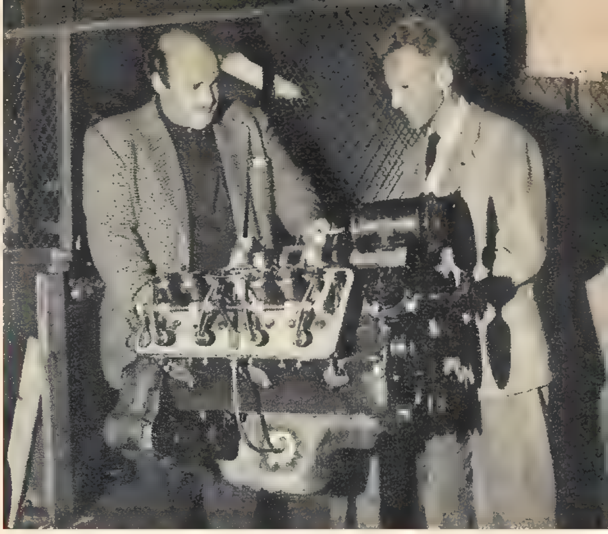


Rear seats can be folded upside down to form an exceptionally large baggage-carrying compartment.



Here's what a stock 100-hp Ford engine looks like with the Ardun overhead valve assembly installed but with cylinder heads removed to show details.

McCahill and Yura Arkus-Duntov, far right, who designed the kit with his brother Zora, inspect the rig. Stock carburetion and ignition are used.



175 HP For Your V-8

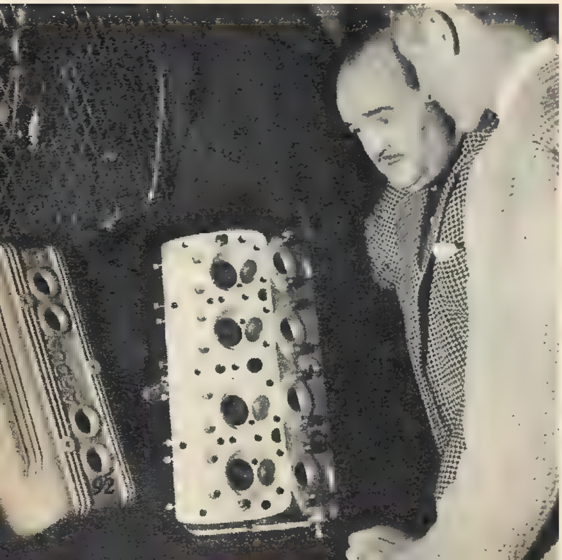
A nice guy named Zora Arkus-Duntov, whom I first met while he was trying to qualify a Talbot at Indianapolis in 1946, has designed and is selling (under the more easily pronounceable name, Ardun, an abbreviated version of his own handle) an overhead valve kit for V-8 Fords that is really a dilly.

A car with a straight Ardun engine tried to qualify at Indianapolis last May and averaged 124 mph, not quite enough to get in the big race but perhaps the fastest time ever recorded out there for a hot Ford.

Ardun claims 175 horsepower at 5200 rpm for a standard, unrebored and untouched Ford block, simply by adding his overhead valve assembly with a compression ratio of only 7 to 1. He says he gets 150 hp at 3600 rpm, as against 100 hp for the stock Ford at this speed. He further claims 225 foot-pounds of torque at 2500 rpm and says that his engine runs as cool as your mother-in-law's scowl when she finds you in the local bar and grill on payday. I don't know how he squeezes 5200 rpm out of a standard Ford ignition system but that's his claim.

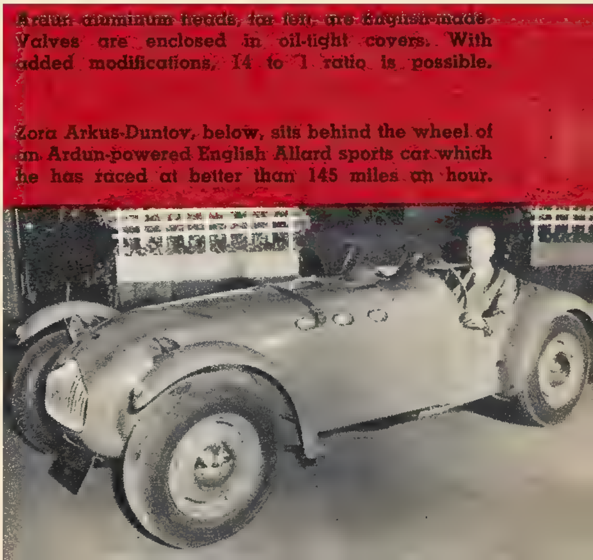
The day I saw this job there wasn't a car around to test so I asked Ardun to make checks for me later. Here they are: in a standard 1949 Ford business coupe, with just the head equipment added, zero to 60 averaged 9.8 seconds, he reported. Zero to 70 went 14 flat. These are very fast times.

This is a slick conversion. I suggest you look into it if you are interested in such things. The price runs around $475 and no special tools are needed to install it, which takes 6-8 hours.—*Tom McCahill.* •



Ardun aluminum heads, far left, are English-made. Valves are enclosed in oil-tight covers. With added modifications, 14 to 1 ratio is possible.

Zora Arkus-Duntov, below, sits behind the wheel of an Ardun-powered English Allard sports car which he has raced at better than 145 miles an hour.



Spout Can for cars has a built-in funnel which doubles as a handle. To pour, the cap is released and the funnel folds back as shown. Strainer can be removed for cleaning. Can's compact shape makes it easy to store in auto trunks or boats. Made by a firm in Stuttgart, Germany, it is destined for U. S.

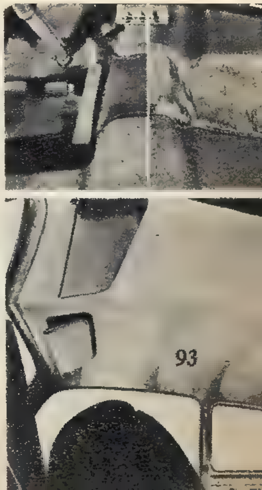
Cuter Scooter is this super-streamlined model being tested by pretty Jane Casey. The place was the First U. S. International Trade Fair in Chicago and its origin is Austrian. Note the unusual rumble seat, rear tire and parking stand. Headlight, horn are built into the steering column. Vents admit cooling air to engine.

NEW for the ROAD

Royal Rolls Royce made for Princess Elizabeth and her husband, the Duke of Edinburgh, is the snazziest in England. Note the radio controls in the center arm rest, the handle for adjusting the seat position, and the heater vents. Through the glass-panel roof, Britons can look down on their royalty.

Kleen 'N' Tint is a complete kit for reconditioning your car's interior. It takes care of the upholstery, steering wheel, dashboard and even the rugs and rubber floor mat. Photos below contrast treated and untreated floor mat (top) and roof and visors (bottom). Made by Kleen 'N' Tint Co., Arndt-Palmer Labs, Melvindale, Mich.

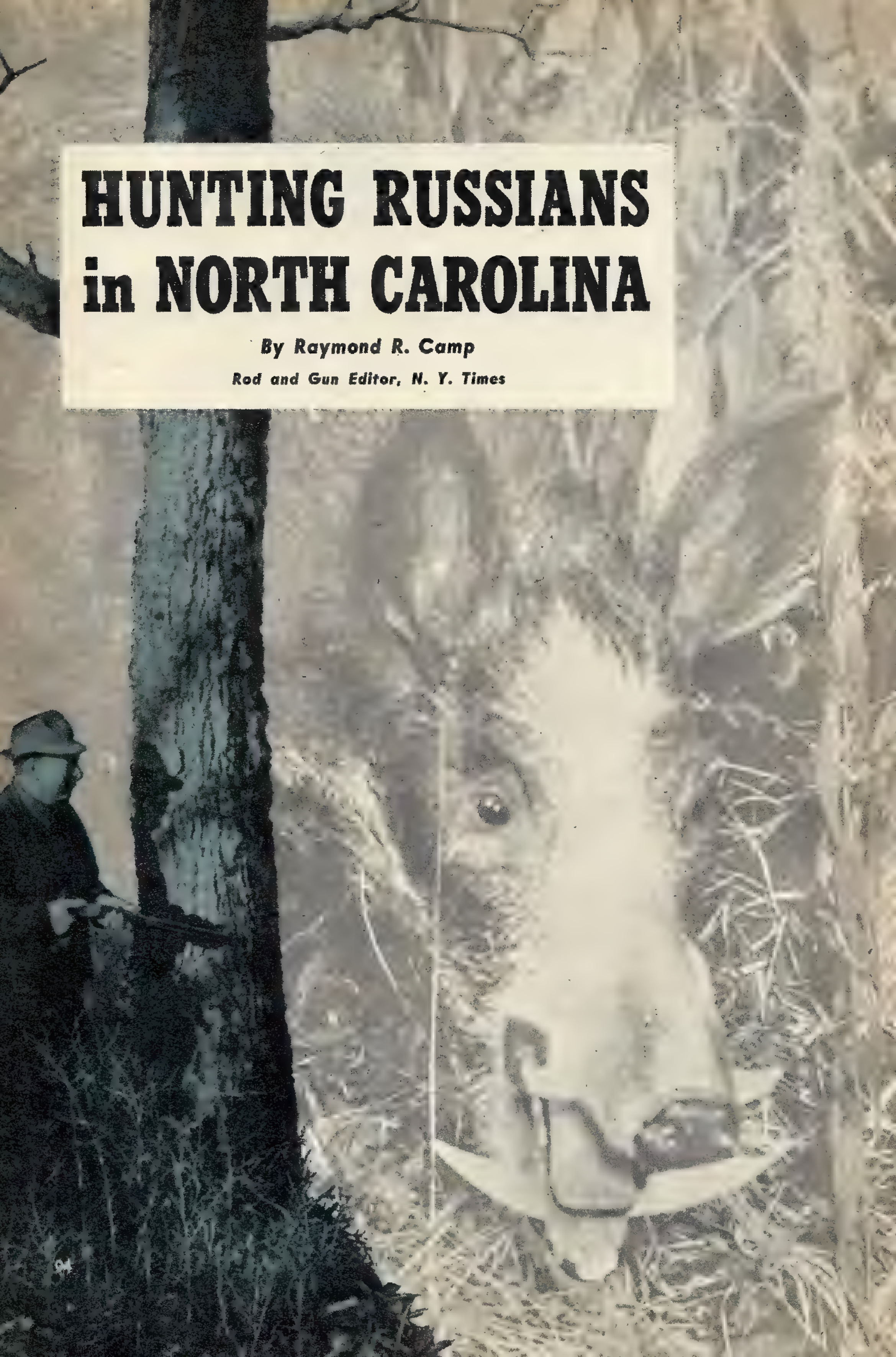
KLEEN 'N' TINT KIT
Rubber Renewer



HUNTING RUSSIANS in NORTH CAROLINA

By Raymond R. Camp

Rod and Gun Editor, N. Y. Times



THERE are Russian *bores* in the United Nations and they cause us peace-loving citizens a lot of trouble. The residents of North Carolina have a Russian *boar* situation, too, but they get a lot of fun out of theirs. As a matter of fact, people visit there from all over the country just so they can join in the sport.

Although the UN bore makes a lot of noise and doesn't have too much bite, the North Carolinian boar is just the opposite. He's a really tough customer. The wild boar of the Great Smokies is considered by veteran hunters to be the most dangerous game animal in North America.

The hunter who goes out after big grizzlies or Alaskan brownies usually has a chance to get in two or three shots in the event his first one fails to down his trophy. But the boar hunter gets in one quick shot and if it isn't a good one, he had better be quick on his feet and a fast climber. Even when mortally wounded, the big "Rooshians" are extremely dangerous for they have amazing speed, vitality and agility. The experienced boar hunter is much happier when he is close to a stout tree with low branches. One flick of those long, sharp tusks can lay open a leg from calf to thigh and many a boar hunter carries deep scars that were inflicted by a heart-shot boar.

"When you shoot," my mountain guide advised me on my first boar hunt, "don't wait to see what happens. Get out of there! If there's a tree handy, climb it. A boar may be dead on his feet, but still moving. While he's able to move he's dangerous."

The country in which the boar is hunted favors the animal rather than the hunter. The cover is heavy and a shot at 50 yards is considered to be extremely long range. The heavy thicket is the boar's protection and he knows it, so if you are going to hunt him you have to do it on his terms, a fact that has made the sport very unsavory to many sportsmen.

Due to the country they inhabit, it is impossible to hunt boar without dogs and the mountain hunters insist there are no dumb boar hounds.

"A stupid hound never gets a reputation as a boar hound for the very simple reason that he doesn't survive his first hunt," one of them explained. "When a boar gets tired of running ahead of the hounds he will stop and take on a couple of his closest pursuers. The dog that rushes in lasts just as long as it takes the boar to flick his head once. A smart hound waits at a safe distance until three or four others arrive, then they circle the animal, making quick rushes

The photographer who took the photo above either was a brave man OR used a telephoto camera lens OR visited a museum. What's your guess?

Four hunters with Plotts and guide prepare to loose their dogs on a boar trail. Below, the quarry is held at bay until the guns arrive.

Photos courtesy North Carolina News Bureau

only when another hound distracts him. We often use 12 or 15 dogs on a hunt and I've never been on one where at least four or five hounds weren't killed or injured."

There were 16 hounds used in the first boar hunt I made and as far as I could tell they were of no particular breed. There were a few foxhounds, several mixed breeds and four of the famous Plott hounds. These hounds, bred by the Plott family near Asheville, N. C., were originally intended for bear hunting. I had heard of this breed which is noted for stamina, nose, courage and intelligence, but I was surprised to find it was such a small dog. Those I saw were larger than a beagle, but smaller than the average foxhound.

They were trained to handle boar just as they did bear, running the animal till it came to bay, then circling it at a safe distance and giving tongue loudly to inform the hunters of its location. Since black bear are plentiful in the Smokies, only the experienced hunters are able to tell which of the two has been jumped during the first few minutes of the chase. A bear often heads for the ridges when jumped, but the boar is inclined to keep to the heavier cover of the low ground and his course is more erratic.

On the hunt mentioned, a bear was jumped first and when the hounds set up their first frantic cries, we spread out immediately in order to cover as much of the area as possible. Walt, a friend who had accompanied me on the trip and whose enthusiasm had dwindled considerably after hearing some of the talk around the fire the previous night, moved off to a vantage point about 100 yards on my left.

At this stage no one knew whether the dogs were running a bear or a boar, but since we were hunting boar, everyone but Walt was hoping it was the latter. A few minutes passed while we listened to the hound music fading into the distance. Then the sound increased in volume and it became apparent that the quarry had made a circle and was heading back toward the line of hunters.

Santa Catalina Island, near Southern California, also has its Russian boar. This is a young one just bagged by Dr. Robert Kennedy of Hollywood.

End of the hunt finds this hunter with a nice head and pelt to take home. Note the tusks. A slash from these can inflict painful wounds.

For a few moments it seemed that the quarry, bear or boar, was headed straight for us, but then it moved to our left through a dense thicket of rhododendron. Walt had taken up a position at the foot of a big beech tree on the fringe of this thicket and when the animal began crashing through the cover a few feet from him, he went up the beech like a monkey. As far as he was concerned, boar hunting left him cold.

When the hounds passed, all of us with the exception of Walt took up the chase and it was almost an hour later that our animal, which turned out to be a bear, ran across an open area in front of one of the hunters and was tumbled. When noses were counted, Walt was found to be missing and it was another half hour before we were able to trace the sound of his shouts to the beech tree.

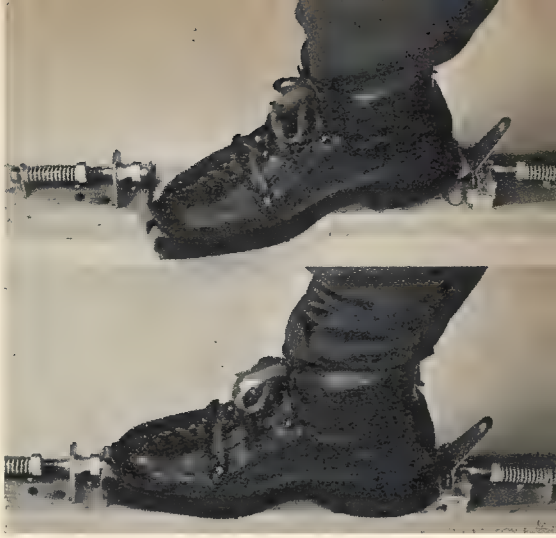
"I'm going to do my boar hunting right in camp," he announced. "And if any boar manages to break into that cabin I'll give him a hell of a battle. Otherwise, I'll stick to Virginia hams. You guys can eat all the wild pork. I could feel that boar breathing down my neck all the way up that tree."

Shortly after noon one of the Plott hounds set up a shrill baying and a few seconds later another one took it up. The owner of these dogs nodded with satisfaction.

"That's a boar," he announced. "I know the difference in the hounds' cry."

A few minutes later the entire pack was in full cry and the boar lead the dogs a merry chase back [*Continued on page* 176]

Head Light for hunters and fishermen has a battery case which clamps on the pants belt and a light which fastens around the head by means of an elastic strap. Power is supplied by eight standard flashlight batteries supplying over 7,000 candlepower. Radio battery can be used. Justrite, North Southport Ave., Chicago.



Saf-T-Clamp ski bindings take the danger out of ski falls. Thin steel plates are screwed to the heels and toes of the boots. These fit in spring clamps attached to the skis which release instantly when feet are tipped. Force can be adjusted up to 250 pounds and can be set light for novice skiers. Cubco, Box 22, Belleville, N. J.

NEW for the SPORTSMAN

Fish Mitt will grip the big ones so they can't slip out of your hands. It is made of thin, flexible, annealed spring steel with sharp prongs on the grasping surface to hold the fish securely and is donned like a glove. Should be just the thing for holding fast to a slippery eel. Al Alston, Capitol Sporting Goods, Green St., Albany, N. Y.

Rod Building Kit has all the materials you'll need to build your own fly-rod, including glued and sanded rod sections, unfinished handle, reel butt, reel seat, guides and tip, ferrules, varnish and even winding silk. Here's a good winter-evening pastime while you wait for opening day. Uslan Inc., Box 389, Spring Valley, N. Y.

CLOWN TOWN, TEXAS

NESVILLE COMMUNITY
IRCUS

Gainesville school girl Pat Reagan really does her part. She's an aerialist and a bare-back rider as well as an upside-down walker.

In the Gainesville circus everybody from housewife to minister gets into the act.

By Joe Whitley

THE night nurse gasped as a circus clown burst into the emergency ward wheeling an unconscious man whose white satin tights were stained and rumpled.

"Just a moment and I'll get you a doctor," she said.

"I *am* a doctor," he snapped and started ministering to the patient.

The clown was Dr. S. M. Yarbrough, a leading Texas physician, and the injured man was Portis Sims, city park director. Both were performers with the Gainesville (Texas) Community Circus, an organization made up of judges, housewives, teachers, students and other assorted citizens of Gainesville, a pleasant little town of 12,000 located 70 miles north of Dallas.

Park director Sims had fallen off a tightwire during his circus act. But it's seldom that accidents like this occur.

The Gainesville circus was started in 1930 to pay off debts of the failing Little Theatre. But it has grown into a community enterprise that is without parallel anywhere else in the world. Each year from April through September it plays towns all over Texas and Oklahoma. Last

Gainesville Community
CIRCUS

Permanent home of the community circus, top, spreads out over a whole square block in Gainesville. It all started as the town's Little Theater.

Aerialists Ralph Gerneth and Morris Hansen work together in packing plant. Their female partners working on the trapezes are also their girl friends.

GAINESVILLE
COMMUNITY CIRCUS

At top is one of the eight fireproof tents which the circus takes with it when it hits the road to give shows in towns all over Texas and Oklahoma.

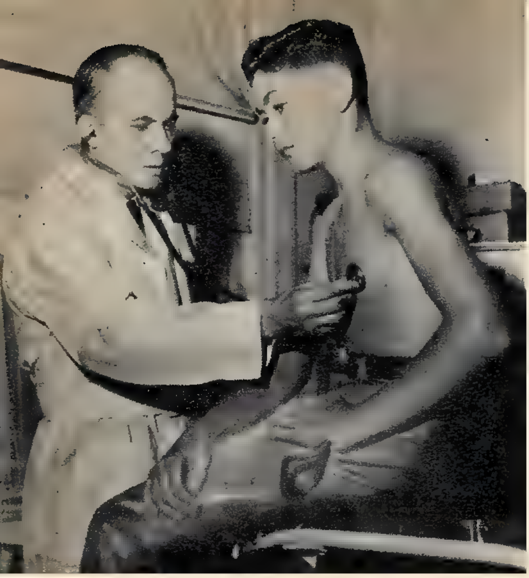
While Dodge dealer Frank Schmitz tries out his oversized cigar, postman Paul Neiball waits in the car for their funny clown act to get under way.

season it traveled between four and five thousand miles, often outdrawing the largest professional shows. Sixty thousand once attended in Dallas and the 52,000 that turned out for a performance in Ft. Worth comprised the largest crowd ever gathered under a single roof in that city.

Gainesville is a circus fan's dream, for not only do they *live* circus the year around but practically everyone gets in the act. The ringmaster, for example, is Roy Stamps—manager of the ice plant. Alex Murrell, power-plant engineer, presents a dog act and his blonde wife, Gerry, rides bareback over flaming hurdles and works a high-wire act with Vern Brewer, a breeder of fancy ponies.

The aerial star who spins suspended from the big top by her teeth is Evelyn Kaps, a pretty high school student. Teaming with Dr. Yarbrough in the clown troupe are such unlikely circus types as A. G. Wells, mathematics professor, and the Reverend Johnstone Beech, rector of St. Paul's Episcopal Church.

Profits go to buy new equipment and costumes and none of the members, who range from five to 70, are paid for perform-



Acrobat Jack Williams has his heart checked by Dr. S. M. Yarbrough. But it's all in the business because the Doc is a clown—and that's no joke.

FAMILY TREE

Mother-and-son clown act makes fun of the monkey in their family tree. That's Mrs. Louise Smith, center, her son Dan, right, and Jimmy Smoot, left.

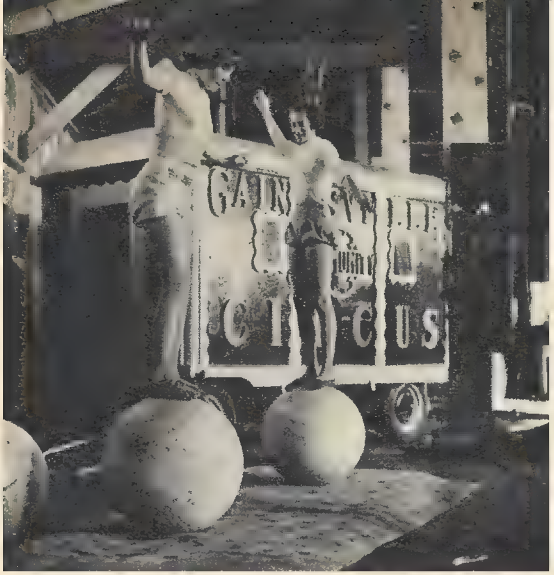
ing. They are, however, amateurs only in the technical sense that they receive no salaries. They present most of the traditional and more difficult circus acts. A leading theatrical publication once reported that their performances compare favorably with those of the best professionals. Most of the feature acts, such as Pat Reagan (a teen-ager who walks upside down in small rings suspended from the top of the tent) have received sizable pro offers. Billy Rose once tried to hire the entire troupe for one of his productions. However, they prefer living at home and keep their performing strictly in the hobby class.

Nothing can stop the troupers from performing. A few years ago, while playing in Ardmore, Oklahoma, a cyclone destroyed their new big-top and damaged most of the equipment. The following day, however, they replaced everything. Then before the next performance, there was a virtual cloudburst. The tent sagged with the weight of the water and threatened to collapse. But the problem was solved when the ingenious Murrell put pails in place and the clowns punctured the roof. It was a little damp thereafter but the show went on.

During the years, the Gainesvillians have managed to work out a routine for carrying on normally both city and circus business in such a way that there is a minimum of interference on either side. One of the best examples of this happened a few years ago when the late County Judge Benjamin

Housewife Gerry Murrell is one of the star riders and tight-rope performers in the circus. Here she rehearses putting her horse through its paces.

Husband Alex Murrell does his share in the community circus, too. Here, he holds the ladder for his high-diving dog Dexter during the act.



High school freshmen Joy Bowles, left, and Kay Fellers, right, practice their balancing-ball act in circus barn. Both are veterans of several seasons.

Backyard practice makes perfect. Here Mrs. Peggy O'Neil watches aerialist Evelyn Kaps demonstrate tricks for two young future members of the circus.

Franklin Mitchell was a member of the clown troupe.

The Judge was featured in an act in which he jumped from a burning house into a net held by the clown fire department. One night a clown dropped a corner of the net and the Judge broke three ribs. Justice didn't suffer, though. For the next three weeks, the judge held court at his bedside at home. He returned to the Circus and to the courtroom the same week.

The Gainesville Community Circus is now big business—a season's profits often run into Wall Street figures. The Circus owns eight fireproof tents, performing animals, steam calliopes, a fleet of ornamental wagons for spectacle numbers and parades plus a square block of buildings.

In fact, in Gainesville it's practically impossible to get away from the circus. Half the homes in town have circus rigging in the backyards and you often see mother and daughter trying out new trapeze or tight-wire acts together while father and son are teaching the family dog to ride on the back of Junior's pony.

Most citizens believe the circus has been the greatest asset Gainesville has ever had. Not only has it made the little city known all over the world but it has welded it into one of the most closely knit towns.

After all, when clergymen, policemen, city officials, teen-agers and other citizens swing together on the flying trapeze there is bound to be mutual understanding of problems. •

Town youngsters love this two-day-old pony born in the circus tent. Clown holding him is John Cunningham, in real life an F.H.A. administrator.

Only money paid to performers is for expenses. A. Morton Smith passes out $10 bills to take care of train meals on the recent trip to Corpus Christi.

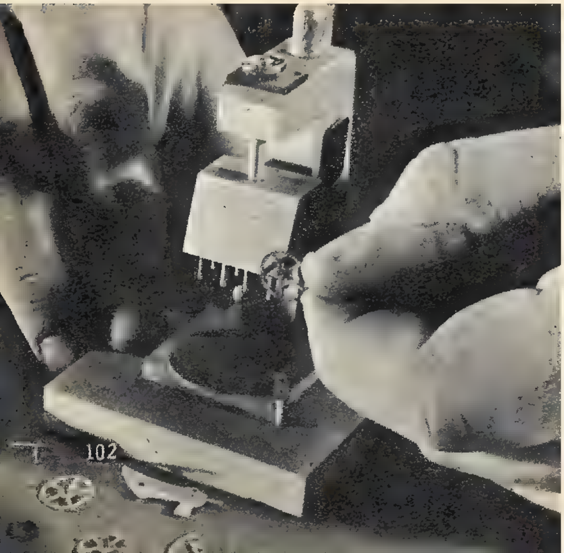
Homer H. Dasey, president of Visual Planning Equipment Company, checks scale specifications for some model equipment made in his own plant.

Small quantities are made completely by hand but for larger orders molds are prepared into which the liquefied materials are then carefully poured.

Toys For Engineers

MI photos by Alfred Eris

Snap fasteners were found to be perfect for simulating wheels and machine parts so Dasey uses them by the thousands. He buys up watch parts, too.



THREE years ago Homer H. Dasey was sure he had a million-dollar idea—but he was laughed out of one engineering office after another. His plan was to mass-produce scale models of production lines and factories for industrial planners.

Today, Dasey gets a big kick out of walking into those same offices and selling thousands of dollars worth of his equipment. For the "toys" he makes are being used by some 500 firms to help them plan construction more efficiently.

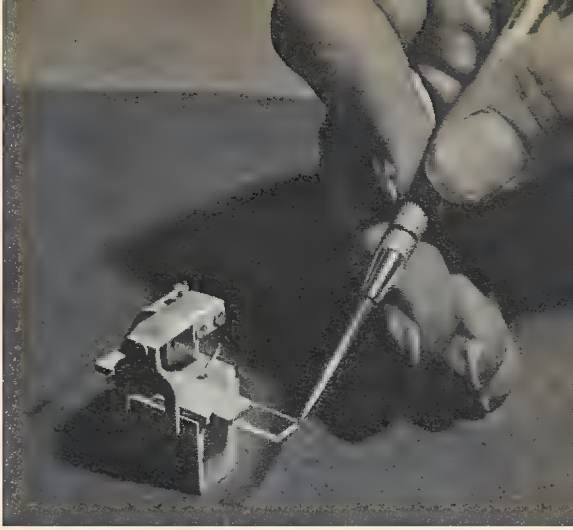
Dasey based his idea on the premise that there is often a blind spot between a stack of blueprints and the actual layout of the production line. Often when a plant is set up from blueprints, costly errors are discovered—errors which show up only in three dimensions.

Now, that's where Dasey comes in. Given

a client's blueprints, he builds a miniature factory—complete to the last machine tool. When it is finished, the engineers can move the tiny conveyors and machines about like toy soldiers and are thus able to foresee any possible bottlenecks.

The U. S. Navy uses Dasey's models to help plan its training courses at stations where space is limited. Eighteen universities also use the models for engineering courses and a leading dairy and food equipment manufacturer in Chicago has a model kit in each of its 25 district offices for selling as well as for planning. District managers say they now make only one drawing for a customer's layout instead of the eight trial-and-error sketches they used to make.

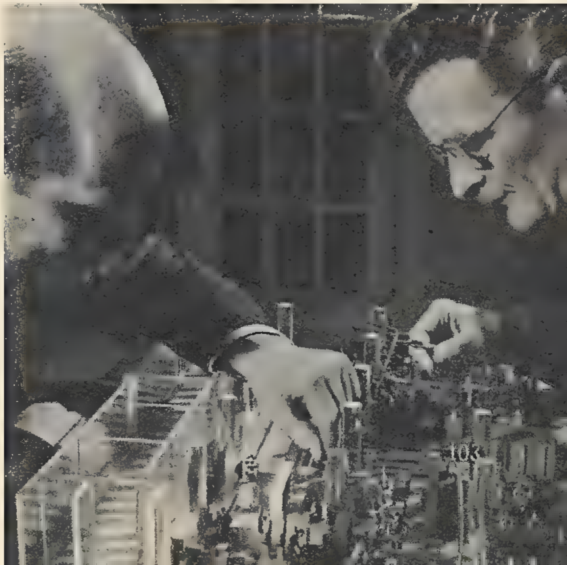
Yes, Dasey's models may look like toys—but American engineers will tell you they are doing a man-sized job! •



To show engineers how much space they must allow for a machine to "travel" Dasey fits small bits of plastic to the edges of the moving parts.

Tool drawing specifications are checked against models of various machine tools. Note the tiny conveyors, rolling mills and multiple drill presses.

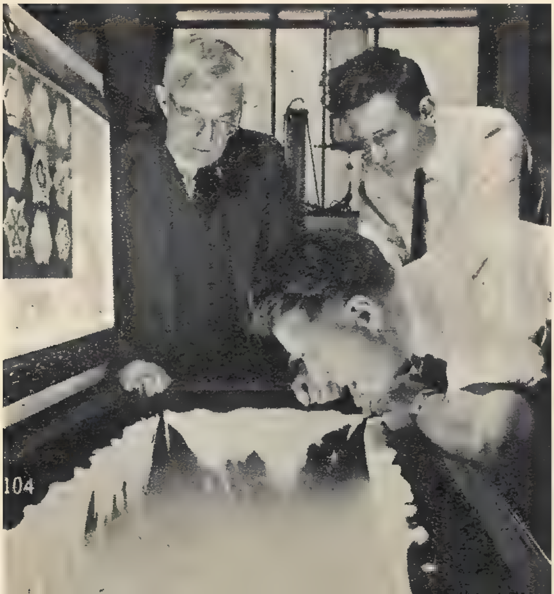
Here's one of Dasey's model factories complete to the tiniest detail. Now it's easier for the engineer to visualize every possible problem.



GE's Vincent Schaefer Shoots Clouds

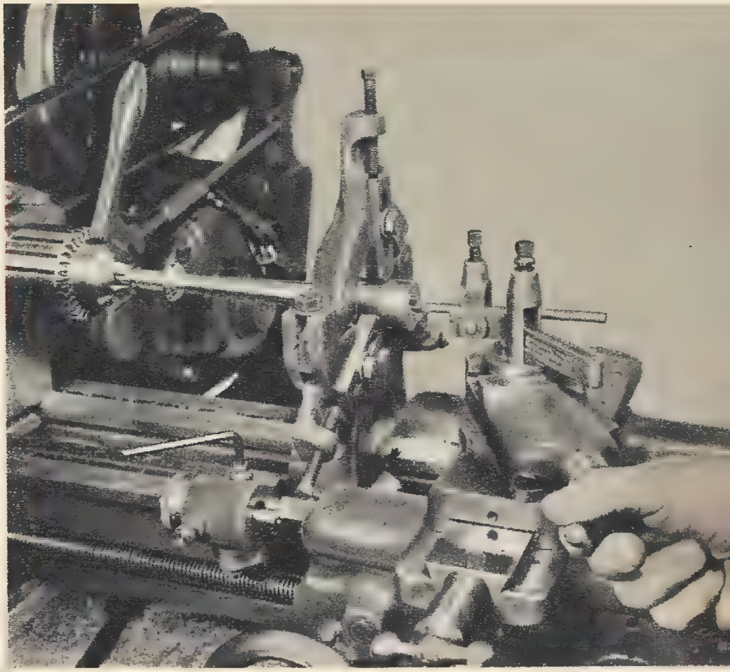
WHEN snow fell on a four-mile stretch of Massachusetts countryside in November, 1946, it was Dr. Schaefer and not the elements who was responsible. He was the first scientist to develop the cloud seeding method of producing snow.

Dr. Schaefer began his career with the General Electric Company as a drill press operator, worked and studied at night till he became a noted scientist. One day he had occasion to film some billowing clouds. They changed so slowly, he rigged his camera so the shutter would click every two seconds. This made the cloud formations that seemed almost motionless to the eye appear like animated cartoons. Since then he has shot 200,000 cloud frames and he finds it not only fun but worthwhile for its applications in meteorology. •



With a small movie camera Dr. Schaefer uses his new technique to record the movements of clouds, top, on movie frames shown at the right. When films are projected, clouds rapidly grow, change and disappear. Left, Dr. Schaefer produces a supercooled cloud by blowing into a home freezer. Then, by seeding with dry ice, the cloud will be turned to snow. Drs. Langmuir and Vonnegut watch experiment closely.

mi Crafts and Hobbies



Get Started On The Screw-Cutting Lathe

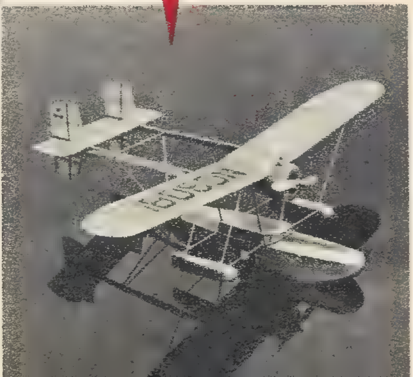
By keeping your eye on MI guy as he machines a candle holder, you'll get a good idea of the versatility of this important shop instrument. Starts on page 110.

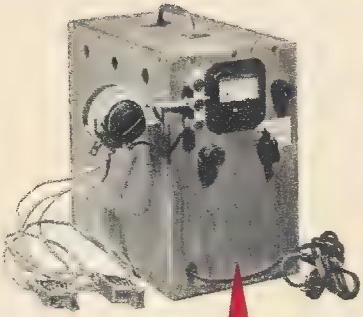
For That Wasted Corner Space . . .

. . . make this highly practical unit. It will hold magazines, a small radio and books without crowding or confusion. Turn the page for full construction information.

Sikorsky Amphibian

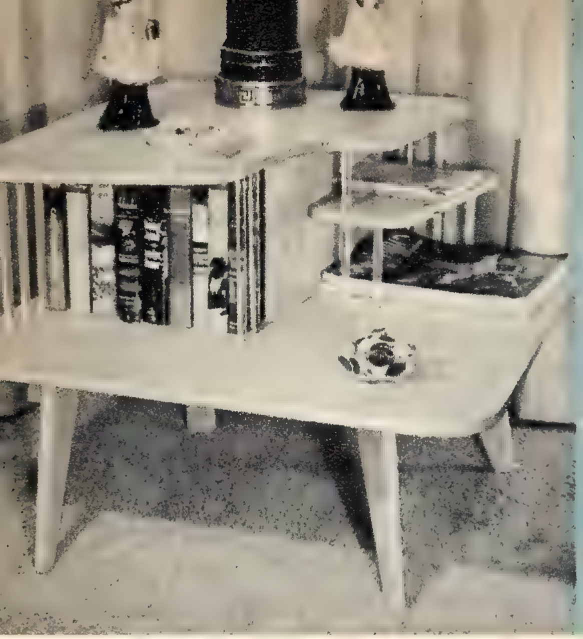
A tailor-made project for you model-makers who are interested in trying out the new "baby" engines. Complete plans for this beauty begin on page 132.

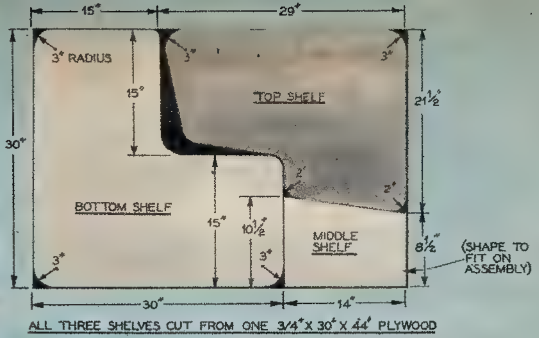


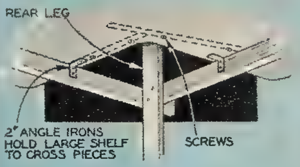


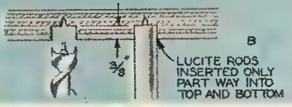
Spruce Up Your Juice . . .

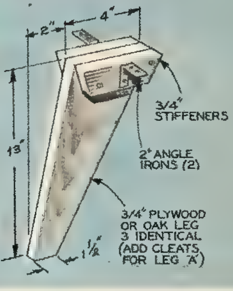
. . . with the MI Battery Charger. You won't have to sweat out those cold snaps with this useful gimmick in your garage. Details are on page 136.




15"
29"
3" RADIUS
3"
3"
15"
TOP SHELF
21½"
30"
2"
2"
BOTTOM SHELF
15"
10½"
MIDDLE SHELF
8½"
(SHAPE TO FIT ON ASSEMBLY)
3"
3"
30"
14"
ALL THREE SHELVES CUT FROM ONE 3/4" X 30" X 44" PLYWOOD


REAR LEG
2" ANGLE IRONS HOLD LARGE SHELF TO CROSS PIECES
SCREWS


B
3/8"
LUCITE RODS INSERTED ONLY PART WAY INTO TOP AND BOTTOM


2"
4"
3/4" STIFFENERS
13"
2" ANGLE IRONS (2)
3/4" PLYWOOD OR OAK LEG 3 IDENTICAL (ADD CLEATS FOR LEG 'A')
1½"

triple-tiered table

Tired of clumsy conventional corner units? Then build this roomy table that offers ample and instantly accessible space.

By Robert Hoppough

DESPITE the tricky appearance of this cleverly designed unit, there's not a complicated joint required in the entire assembly. In fact, you can't even see where most of the elements join unless you turn the table upside down. And if you've discovered how impractical those commercial corner units are with their triangular dust-catching shelves, this job will really appeal to you. It provides ample space for magazines, a niche to hold a few books or a small radio and a surface for a lamp. Also, the entire affair is plenty high enough to clean under. The space behind the risers has been deliberately left open. If you can use an extra hidden compartment, modify the bottom shelf accordingly.

Here are the main steps: Cut out the legs and 1x3-in. cross pieces and join them so that the glue will have a chance to dry while you cut and sand the shelves.

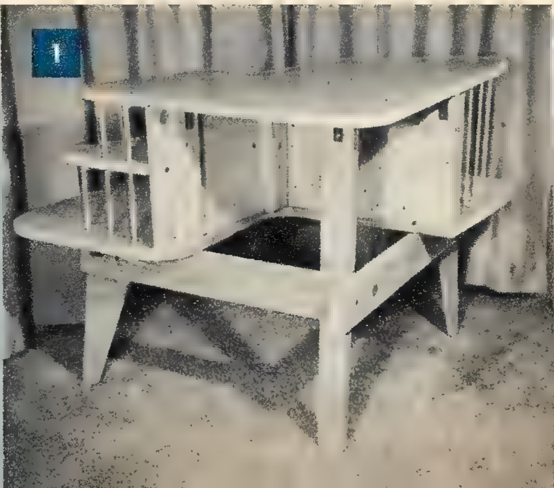
You'll note from the cutting diagram for the shelves that material can be saved by making the cuts as shown. Another saving

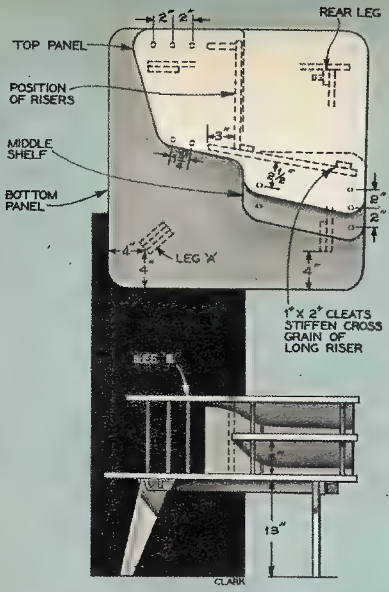
1 Rear view shows 2-in. brackets that reinforce glue and screws. Empty space can be adapted to your own needs for storage or even a radio chassis.

2 Squaring legs and reinforcement pieces with a disk sander. Note scrap piece on table which keeps the leg perpendicular to the disk surface.

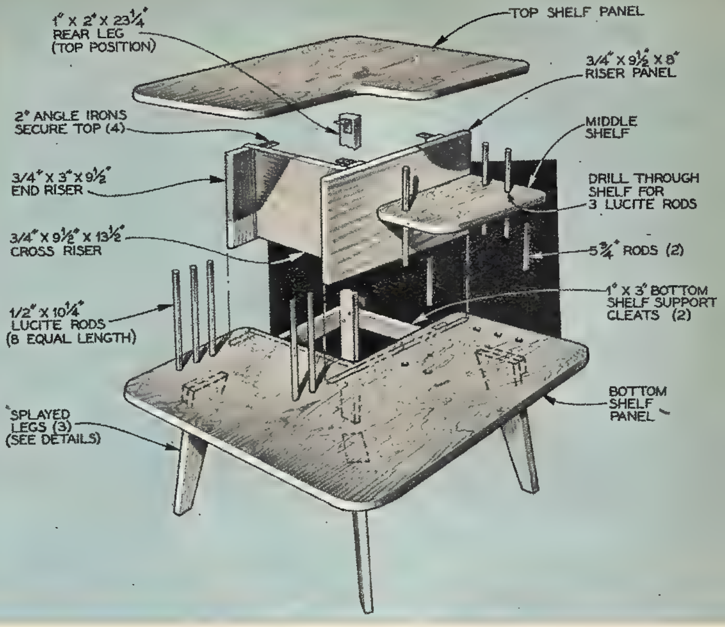
3 Holes for Lucite rods in middle shelf and lower table surface are made simultaneously. Do not penetrate the lower piece more than about ⅜ in.

1




2"
2"
REAR LEG
TOP PANEL
POSITION OF RISERS
3"
MIDDLE SHELF
1¾"
2½"
BOTTOM PANEL
2"
2"
4"
LEG 'A'
4
4"
1" X 2" CLEATS STIFFEN CROSS GRAIN OF LONG RISER
SEE 'A'
13"
CLARK

TOP AND FRONT VIEWS OF ASSEMBLED CORNER TABLE


TOP SHELF PANEL
1" X 2" X 23¼" REAR LEG (TOP POSITION)
3/4" X 9½" X 8" RISER PANEL
2" ANGLE IRONS SECURE TOP (4)
MIDDLE SHELF
3/4" X 3" X 9½" END RISER
DRILL THROUGH SHELF FOR 3 LUCITE RODS
3/4" X 9½" X 13½" CROSS RISER
5¾" RODS (2)
1" X 3" BOTTOM SHELF SUPPORT CLEATS (2)
1/2" X 10¼" LUCITE RODS (8 EQUAL LENGTH)
BOTTOM SHELF PANEL
SPLAYED LEGS (3) (SEE DETAILS)

can be made by substituting ½-in. dowels for the Lucite rods. The Lucite will add considerably to the appearance of the table, though, and will probably cost only a few dollars extra.

Next cut out the riser boards, round the ends as shown, sand all outside surfaces, and attach to the bottom shelf. Some glue in addition to screws will help to make the table rigid. Be careful not to dab any glue on the exterior surfaces where it will interfere with a good finishing job later.

Now drill the holes ⅜-in. deep in the bottom shelf for the rods. Lay the small middle shelf right over these holes to mark where to drill next. (If you have a drill press the job is of course simplified, but be sure to make these holes before attaching the legs to the bottom shelf.) Note that the two short outer rods do not penetrate clear through this shelf, but just far enough to keep them secure.

The glue on the leg assemblies should be set by now. Therefore attach the legs and temporarily screw on the top shelf after first inserting all the rods.

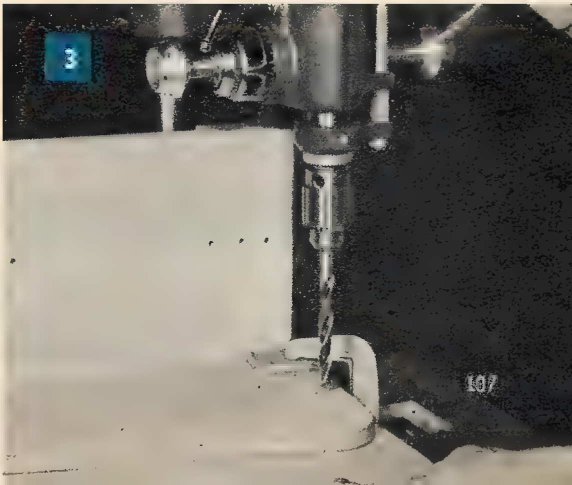
Be sure that you adjust all the rods into their proper parallel position. Mark off the circles where they touch the top shelf. Remove the latter and bore the holes.

Next remove the rods and complete the surfacing of the wood. Remember that No. 0 or 00 steel wool gives a smooth satiny finish as a finale to a good sandpapering. From there it's a matter of choice. The paint-on, wipe-off system gives a good modern touch when followed by a few coats of shellac rubbed down between coats with steel wool.

You're ready for the ultimate thrill of accomplishment now. Insert the rods, attach the top shelf and work each rod into its proper place. Then set your table in that gaping corner—and put it to work! •

2

3



The Great Joiner

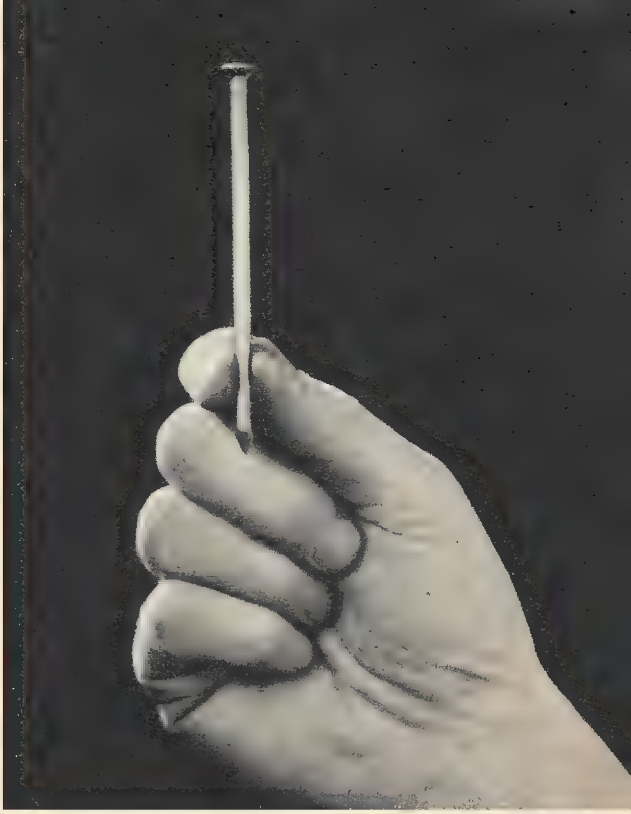
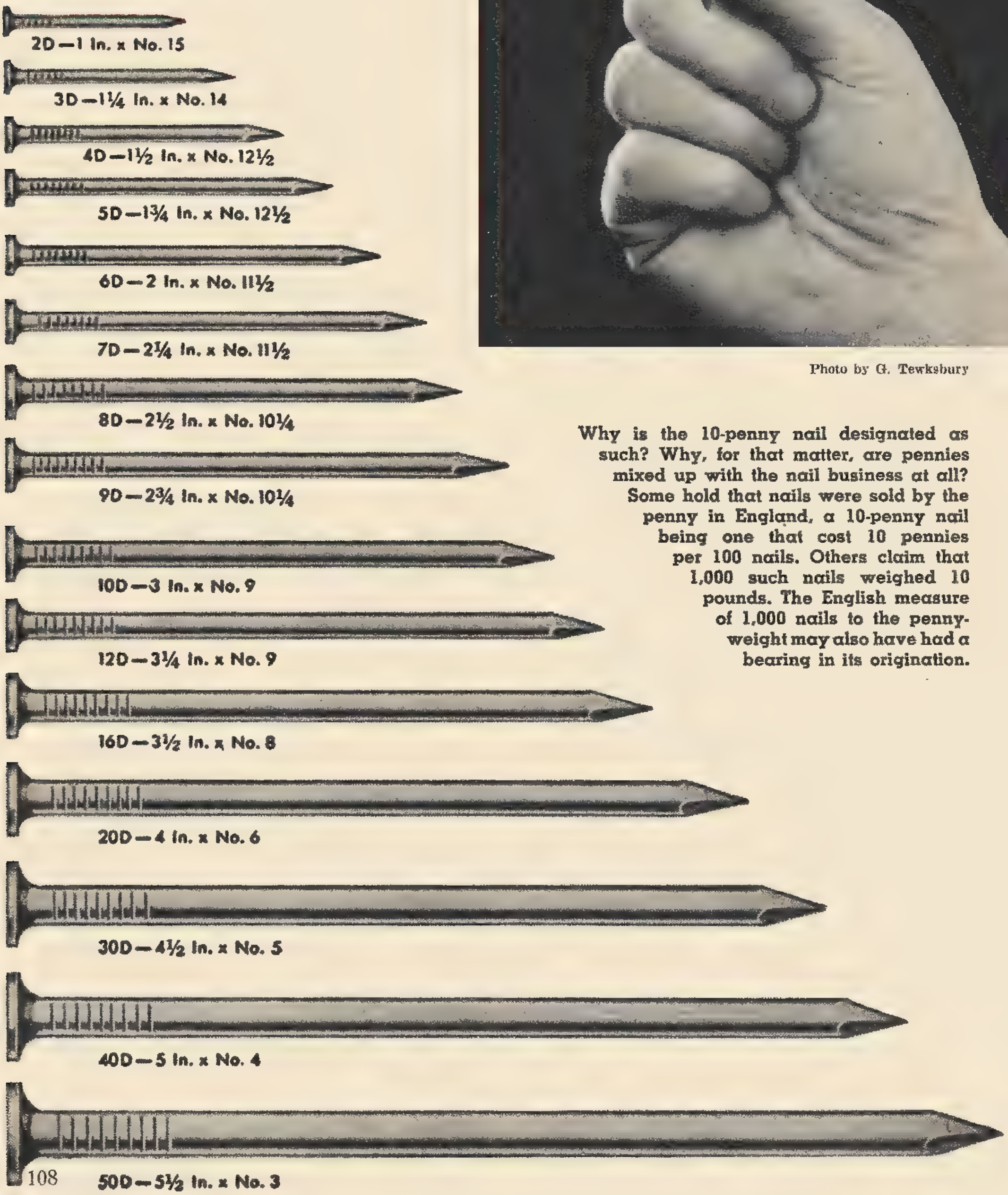


Photo by G. Tewksbury

Why is the 10-penny nail designated as such? Why, for that matter, are pennies mixed up with the nail business at all? Some hold that nails were sold by the penny in England, a 10-penny nail being one that cost 10 pennies per 100 nails. Others claim that 1,000 such nails weighed 10 pounds. The English measure of 1,000 nails to the pennyweight may also have had a bearing in its origination.


2D—1 In. x No. 15
3D—1¼ In. x No. 14
4D—1½ In. x No. 12½
5D—1¾ In. x No. 12½
6D—2 In. x No. 11½
7D—2¼ In. x No. 11½
8D—2½ In. x No. 10¼
9D—2¾ In. x No. 10¼
10D—3 In. x No. 9
12D—3¼ In. x No. 9
16D—3½ In. x No. 8
20D—4 In. x No. 6
30D—4½ In. x No. 5
40D—5 In. x No. 4
50D—5½ In. x No. 3

By Clarence A. Martin
Chairman, Industrial Arts, Erasmus Hall
High School, Brooklyn, N. Y.

THE popular saying that one is as sharp as a tack but just as flat-headed could also apply to the needle-pointed nail. This little sharpie is only one of more than 1100 types and sizes of nails that are being manufactured today.

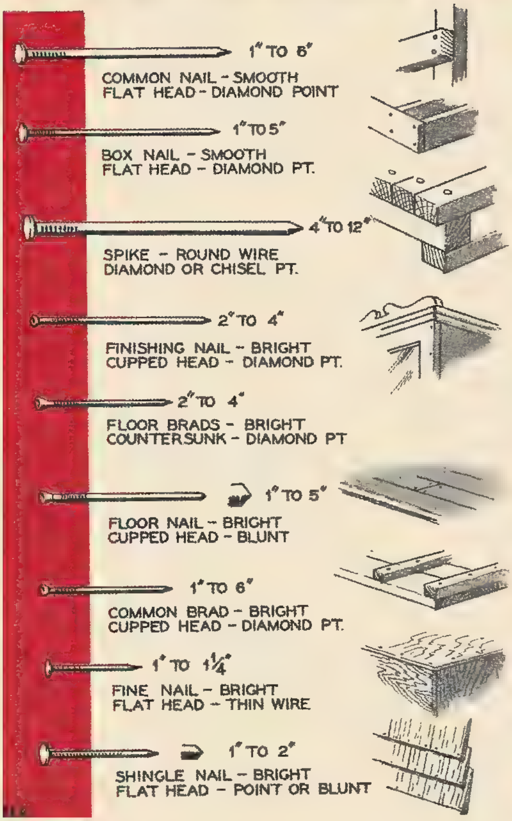
The nail, one of the greatest of joiners, is now so commonplace that its importance to the world of today is generally overlooked. The shortages during World War II spotlighted its importance. The lack of nails was felt especially in the building trades as about 400 pounds of them are used in the construction of the average home.

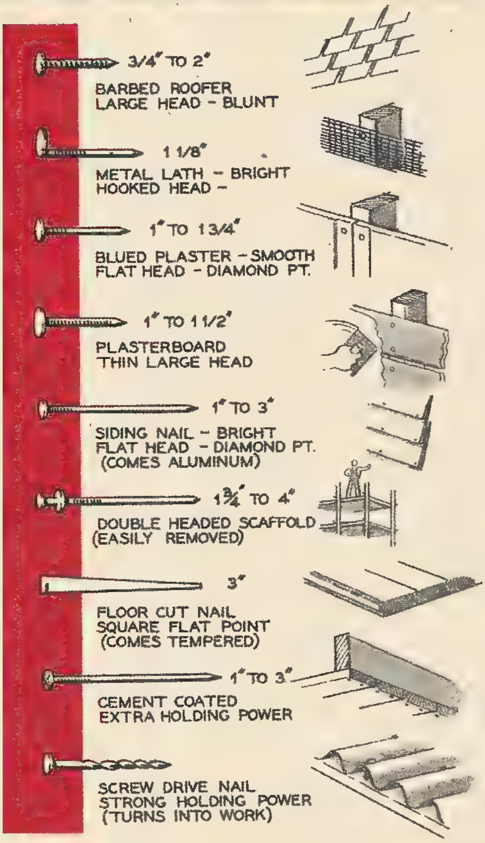
In 1948 the steel mills made about a million tons of nails that ranged from $\frac{1}{16}$ of an inch to 15 inches in length. Most of them however were between three-penny (1¼ inches) and twenty-penny (4 inches). The majority of these are made of steel wire, in fact, about 20 per cent of all of the steel wire that is produced is used in the manufacture of nails.

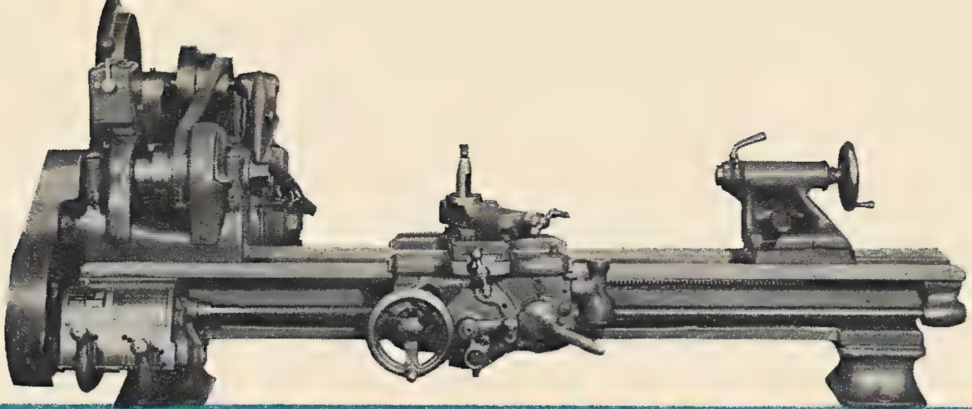
A primitive form of fastening that was used by prehistoric man was a leather thong made from the hide of animals. This method is still in use today where civilization has not penetrated. Fastening with thongs was followed by the use of wood pins. These same kind of wood pins were still being used for holding together large timbers until quite recently when large size spikes were made generally available.

Probably the first reference to nails was made about 1055 B. C. in Chronicles XXII, 3 "And David prepared iron in abundance for the nails, for the doors of the gates, and for the couplings."

For centuries nails were formed by hand on an anvil. This was a home industry in which all members of the family participated. During the seventeenth century the methods used in producing the nail rods were improved to such an extent that the industry grew tremendously. The heads of the nails however were still forged by a hand operation. In Birmingham, England, the center of the world nail industry at the beginning of that century, more [*Continued on page* 170]


1" TO 6"
COMMON NAIL - SMOOTH
FLAT HEAD - DIAMOND POINT
1" TO 5"
BOX NAIL - SMOOTH
FLAT HEAD - DIAMOND PT.
4" TO 12"
SPIKE - ROUND WIRE
DIAMOND OR CHISEL PT.
2" TO 4"
FINISHING NAIL - BRIGHT
CUPPED HEAD - DIAMOND PT.
2" TO 4"
FLOOR BRADS - BRIGHT
COUNTERSUNK - DIAMOND PT
1" TO 5"
FLOOR NAIL - BRIGHT
CUPPED HEAD - BLUNT
1" TO 6"
COMMON BRAD - BRIGHT
CUPPED HEAD - DIAMOND PT.
1" TO 1¼"
FINE NAIL - BRIGHT
FLAT HEAD - THIN WIRE
1" TO 2"
SHINGLE NAIL - BRIGHT
FLAT HEAD - POINT OR BLUNT

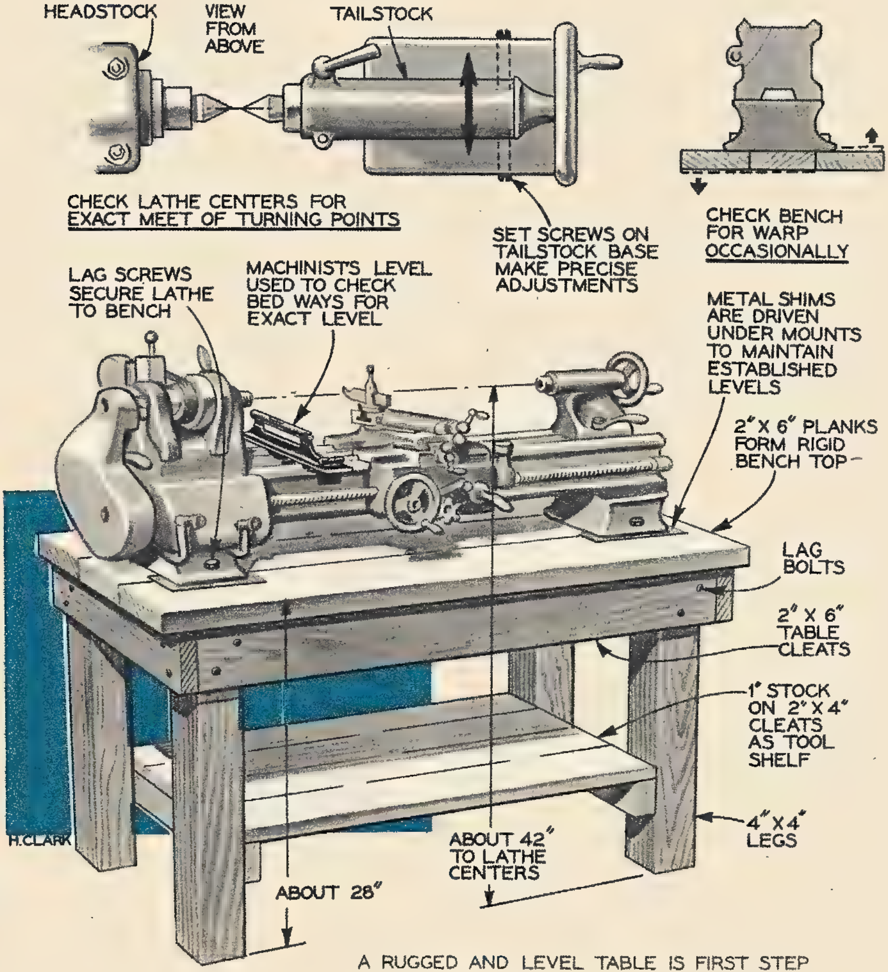

3/4" TO 2"
BARBED ROOFER
LARGE HEAD - BLUNT
1 1/8"
METAL LATH - BRIGHT
HOOKED HEAD -
1" TO 1 3/4"
BLUED PLASTER - SMOOTH
FLAT HEAD - DIAMOND PT.
1" TO 1 1/2"
PLASTERBOARD
THIN LARGE HEAD
1" TO 3"
SIDING NAIL - BRIGHT
FLAT HEAD - DIAMOND PT.
(COMES ALUMINUM)
1¾" TO 4"
DOUBLE HEADED SCAFFOLD
(EASILY REMOVED)
3"
FLOOR CUT NAIL
SQUARE FLAT POINT
(COMES TEMPERED)
1" TO 3"
CEMENT COATED
EXTRA HOLDING POWER
SCREW DRIVE NAIL
STRONG HOLDING POWER
(TURNS INTO WORK)



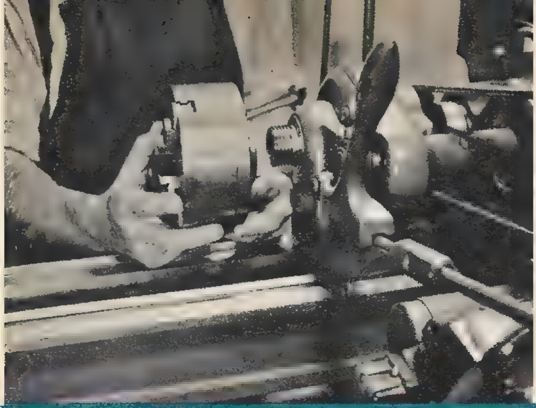
The Screw-Cutting Lathe

Want to operate one of the most versatile machines going? Then put on an apron, roll up your sleeves and stand next to our author as he undertakes a simple but thorough project.

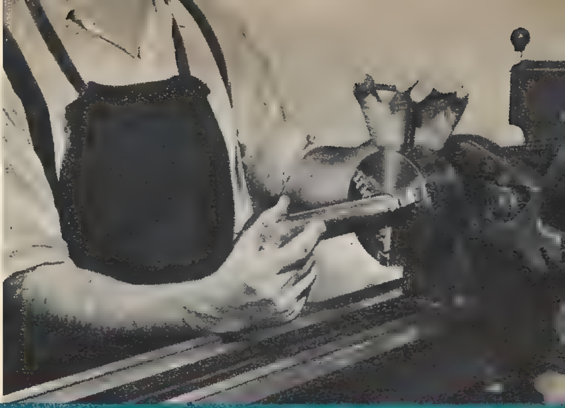
By Robert Hertzberg


HEADSTOCK
VIEW FROM ABOVE
TAILSTOCK
CHECK LATHE CENTERS FOR EXACT MEET OF TURNING POINTS
SET SCREWS ON TAILSTOCK BASE MAKE PRECISE ADJUSTMENTS
CHECK BENCH FOR WARP OCCASIONALLY
LAG SCREWS SECURE LATHE TO BENCH
MACHINISTS LEVEL USED TO CHECK BED WAYS FOR EXACT LEVEL
METAL SHIMS ARE DRIVEN UNDER MOUNTS TO MAINTAIN ESTABLISHED LEVELS
2" X 6" PLANKS FORM RIGID BENCH TOP
LAG BOLTS
2" X 6" TABLE CLEATS
1" STOCK ON 2" X 4" CLEATS AS TOOL SHELF
4" X 4" LEGS
ABOUT 42" TO LATHE CENTERS
ABOUT 28"
H. CLARK

A RUGGED AND LEVEL TABLE IS FIRST STEP TOWARD GOOD SUPPORT AND TRUE OPERATION



Ends of the brass rod for the upright will have to be squared off and drilled for center holes. The rod will be gripped in this three-jaw chuck.



Supporting free end of candle holder rod, tighten chuck. Jaws are self-centering so that they all move simultaneously when key is turned.

"KING of the machine tools" is what happy owners call the back-geared screw-cutting lathe. It well deserves the title because of its almost endless applications in home and industrial shops of every conceivable nature. Using the identical lathe, a hobbyist makes camera accessories and wheels for model locomotives; an auto repair man resizes pistons and smoothes down commutators; a factory hand turns out gun barrels and airplane fittings. Although the screw-cutting lathe has existed for more than 200 years, new uses for it are cropping up every day!

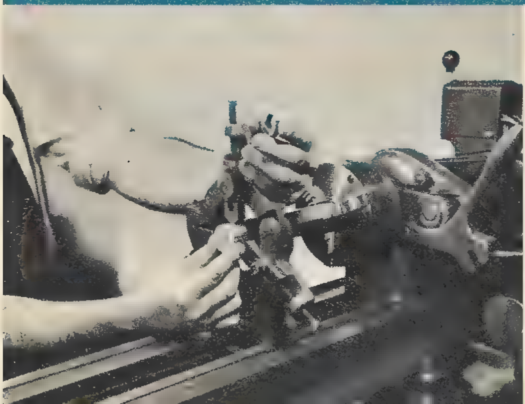
For home and small machine shops, the most popular lathe sizes are 9 and 10 in. These figures represent the maximum diameter of work that can be accommodated. Actually the practical limit for turning between centers is less because the tool carriage has to slide under the work while the latter is revolving. This means limits of approximately 5 and 6 in. The length of the work that can be handled depends on the over-all length of the machine, which runs from 3 to about 5 ft. A good compromise size is 4 ft., which takes work 28 in. between centers.

An electrical rather than a mechanical consideration fixes the "small shop" lathe at 9 or 10 in. In these sizes the machine works satisfactorily with a ⅓ or better yet a ½-hp motor, which is about the most powerful motor that can be run safely on an ordinary house power line. Larger lathes require larger motors, which in turn may require special power lines.

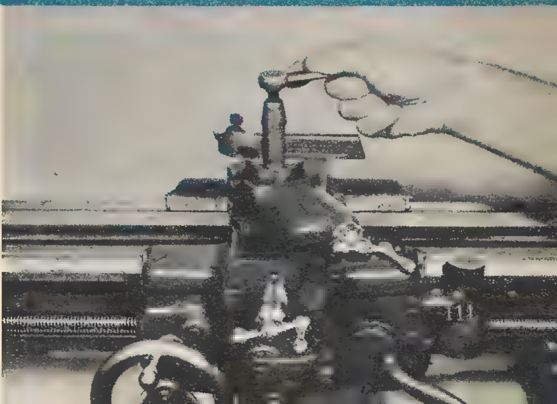
The back-geared lathe is intended primarily for machining metal. It has also proved to be highly successful on plastics. However, it shouldn't be used for wood turning except as a matter of sheer necessity. You won't find this bit of advice in any of the standard lathe instruction books, but every experienced operator will agree with it heartily. The clouds of shavings produced during a wood-turning job form a sticky, messy combination with the oil and grease on the bearings and gears. Removing it all is a time-consuming chore, and you'll find that wood had better be left to the machine for which it was intended.

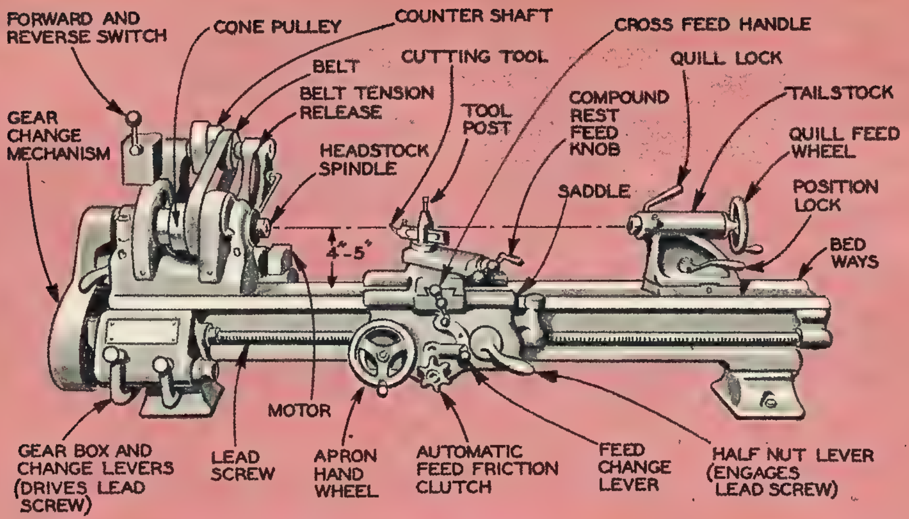
Any intelligent person can learn to use a back-geared lathe by himself. If your first impression is that the machine is complicated, compare the controls or adjustments on it with those on an ordinary car. On my South Bend 9-in. lathe, pictured on page 110, I count 16 handles,

End of rod is retained by this steady rest, which has individually adjusted jaws. After jaws are positioned by end screws, tighten bolts as shown.

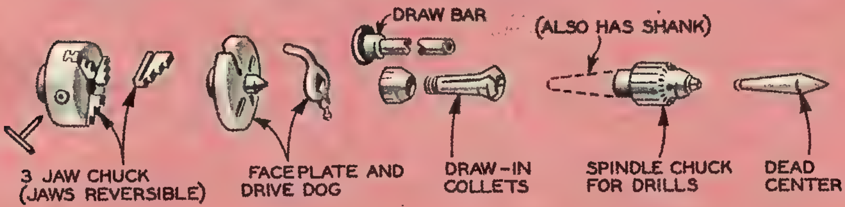


Since tool holder takes force of revolving work it must be well tightened. Side-facing bit is in holder preparatory to facing end of the rod.

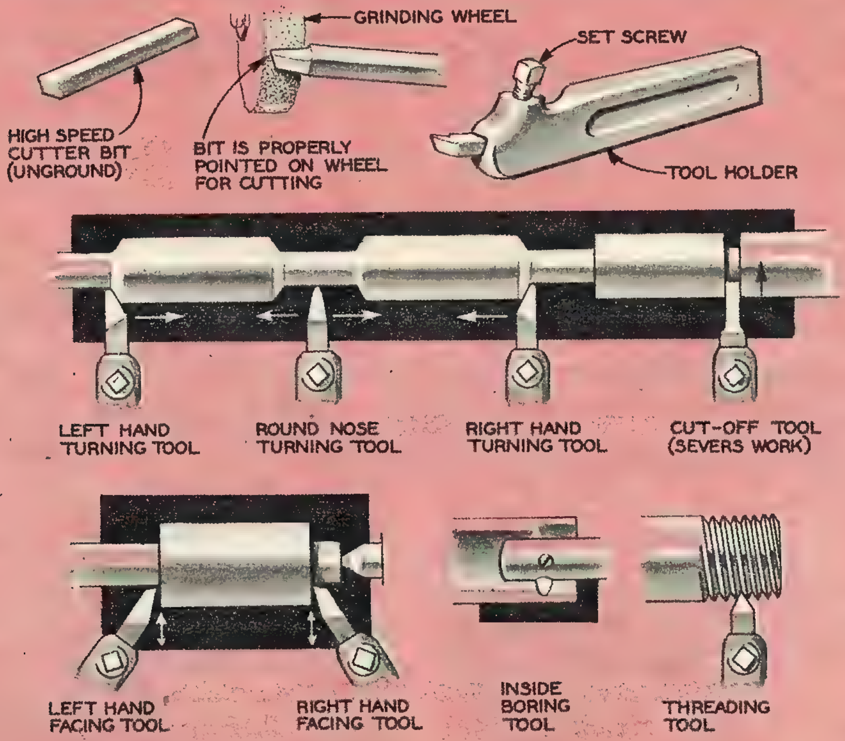



FORWARD AND REVERSE SWITCH
CONE PULLEY
COUNTER SHAFT
CROSS FEED HANDLE
BELT
CUTTING TOOL
QUILL LOCK
GEAR CHANGE MECHANISM
BELT TENSION RELEASE
TOOL POST
COMPOUND REST FEED KNOB
TAILSTOCK
QUILL FEED WHEEL
HEADSTOCK SPINDLE
SADDLE
POSITION LOCK
4"-5"
BED WAYS
MOTOR
GEAR BOX AND CHANGE LEVERS (DRIVES LEAD SCREW)
LEAD SCREW
APRON HAND WHEEL
AUTOMATIC FEED FRICTION CLUTCH
FEED CHANGE LEVER
HALF NUT LEVER (ENGAGES LEAD SCREW)

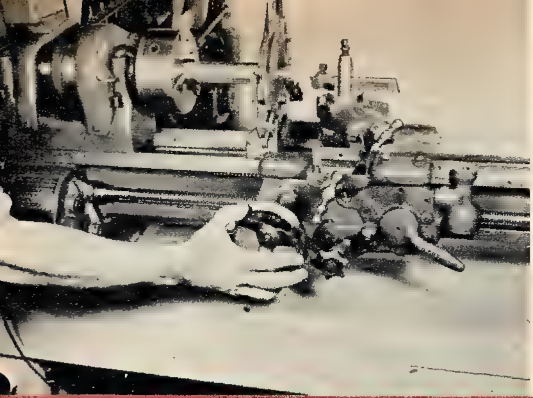
CONTROL UNITS ON SMALL WORKSHOP METAL SCREW LATHE


DRAW BAR
(ALSO HAS SHANK)
3 JAW CHUCK (JAWS REVERSIBLE)
FACE PLATE AND DRIVE DOG
DRAW-IN COLLETS
SPINDLE CHUCK FOR DRILLS
DEAD CENTER

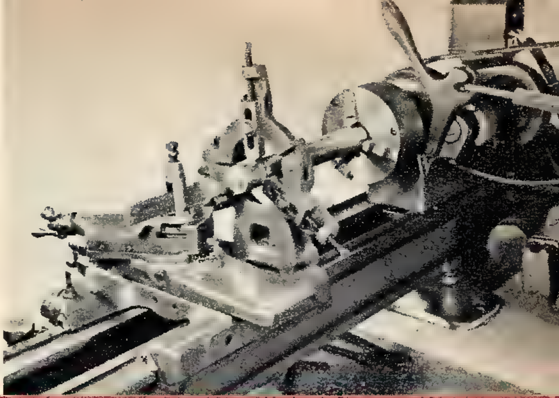
AN ASSORTMENT OF DRIVE UNITS FOR USE ON THE HEADSTOCK


GRINDING WHEEL
SET SCREW
HIGH SPEED CUTTER BIT (UNGROUND)
BIT IS PROPERLY POINTED ON WHEEL FOR CUTTING
TOOL HOLDER
LEFT HAND TURNING TOOL
ROUND NOSE TURNING TOOL
RIGHT HAND TURNING TOOL
CUT-OFF TOOL (SEVERS WORK)
LEFT HAND FACING TOOL
RIGHT HAND FACING TOOL
INSIDE BORING TOOL
THREADING TOOL

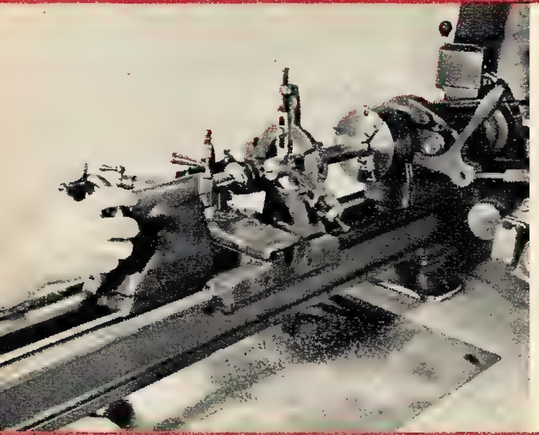
A FEW OF THE MOST POPULAR TOOL BITS AND THEIR CUTS



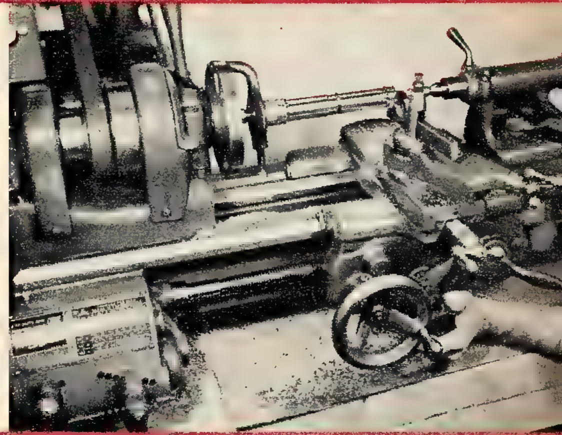
With holder properly adjusted, the carriage is moved to the left by means of the apron hand wheel until the cutter bit just touches the metal.



Squaring rod ends. Carriage is locked and tool is advanced, then faced across rod with cross feed knob. Later turning removes score markings.



Combination drill-countersink in tailstock chuck is used to make holes. The drill is advanced into the brass as tailstock wheel revolves slowly.

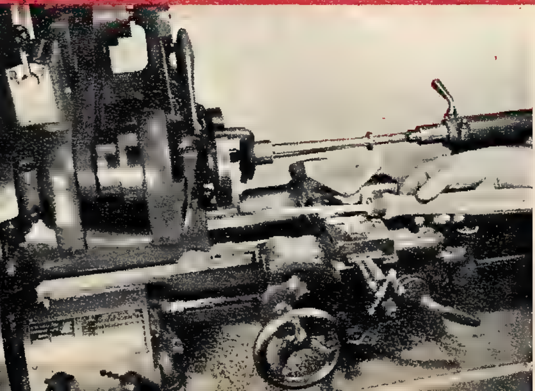


In turning, rod is held between centers; tool is automatically moved from right to left by the lead screw. The bed is swept clean periodically.

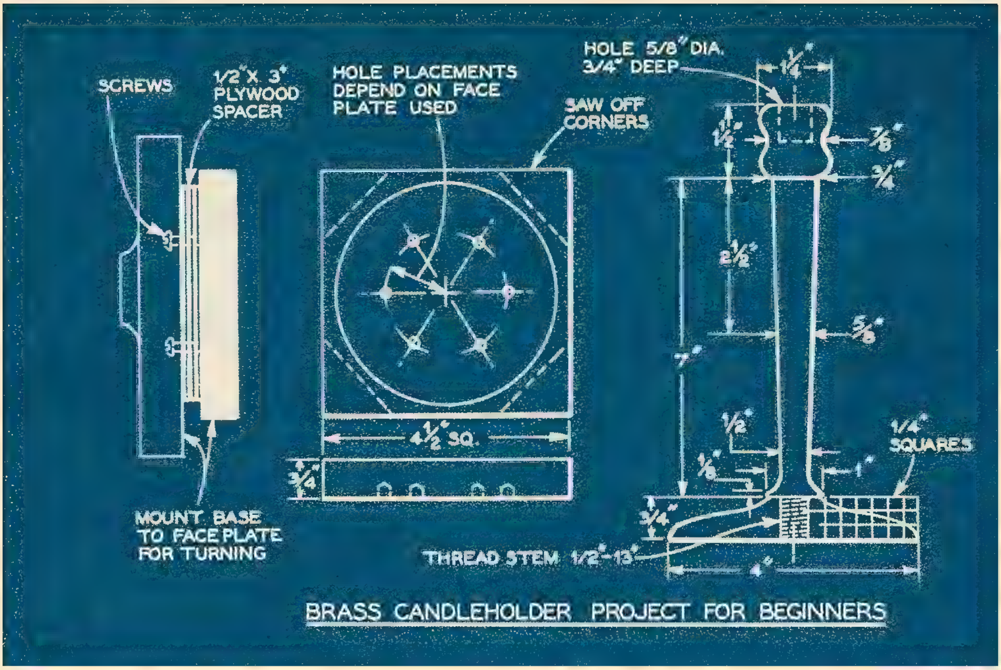
wheels, levers, etc., that can be moved or turned. On my Ford there are 25 controls of one sort or another on the instrument panel, and four more on the floor board. The lathe is anchored to the cellar floor; the car moves at speeds up to 90 mph. Frankly, I think a metal-turning lathe is easier to use than a wood-turning machine. In the former, the cutting tools are securely clamped into position and for the most part are moved in the desired direction by the gear trains actuated by the headstock spindle. Straight turning and threading operations are virtually automatic.

To give you an idea of what metal lathe technique is like, let's put the machine

Compound rest is replaced by T rest. Long taper was made with ½-in. carbide-tipped chisel. Soft brass has no noticeable dulling effect on edge.



Bead at lower end of candlestick is formed by rolling sharp file over brass while lathe turns at high speed. Light strokes will prevent clogging.


SCREWS
1/2" X 3" PLYWOOD SPACER
HOLE PLACEMENTS DEPEND ON FACE PLATE USED
HOLE 5/8" DIA. 3/4" DEEP
SAW OFF CORNERS
1¼"
1½"
7/8"
3/4"
2½"
5/8"
7"
1/2"
1/8"
1"
1/4" SQUARES
3/4"
4½" SQ.
3/4
MOUNT BASE TO FACE PLATE FOR TURNING
THREAD STEM 1/2"-13
4"
BRASS CANDLEHOLDER PROJECT FOR BEGINNERS

Cutting off corners on the candlestick base will make it easier to trim. Base is attached to faceplate with ½-20 screws driven into threaded holes.

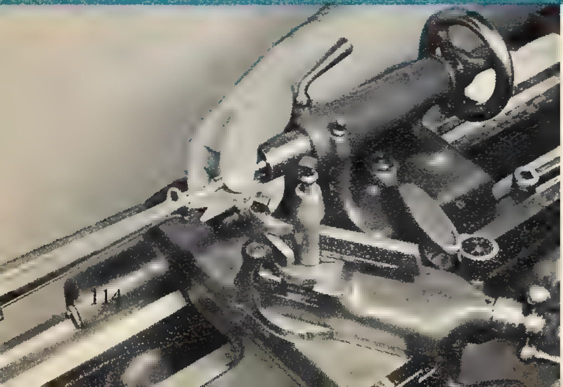
through a few of its paces. A good project is a solid brass candle holder. Brass is nice stuff because it turns readily, looks really beautiful as the cutting tool exposes a new surface and is easily obtainable in round and flat forms. For the upright we'll want a rod about 1¼ in. in diameter and 9 in. long. The base is formed from a flat piece about ¾ in. thick and 4½ in. square. We'll do the upright first, then the base, and finally assemble them by screwing the two pieces together. The finished unit appears on page 116.

The following operations will be performed: facing, drilling, boring, turning, tapering, shaping to a curve, threading, polishing and cutting off. Standard accessories and tools will be employed throughout. Follow the step-by-step pictures and you'll finish with a pretty good idea of basic lathe work.

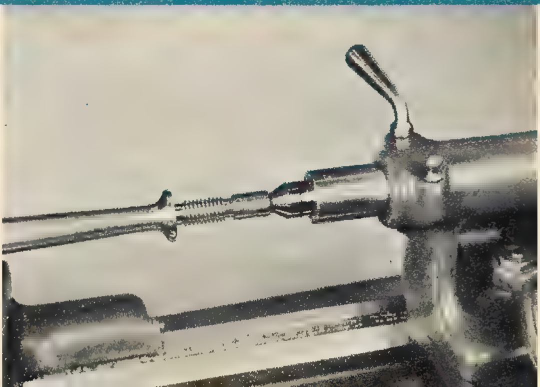
Making straight cuts is easy. The cutting tools can be adjusted to shave off metal along the length of the work or parallel to its face. With the compound rest, short cutting at angles between 0 and 90 degrees is likewise simple. The real problems are making straight *tapered* cuts and curved forms.

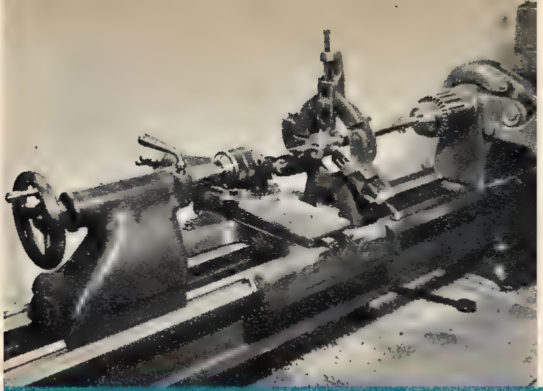
The instruction books tell you to offset the tailstock to make a long taper. Machinists cry "Don't!"—for it's very difficult to get the tailstock back on exact dead center. The voice of experience is right again. If accurate taper turning is to be done, the lathe carriage should be fitted with a taper attachment. This controls the depth of bite of the cutting tool without

Secret of clean, sharp threads is proper setting of 60° cutting tool square onto work at dead center. The gauge shown below is indispensable.

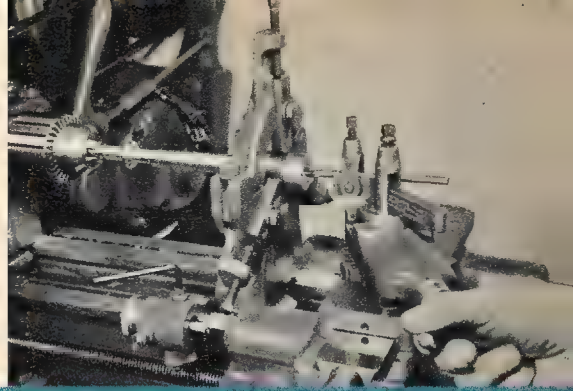


Note slightly undercut sections on both sides of threads. Extension at right will be cut off so that candle holder can be screwed to the base.

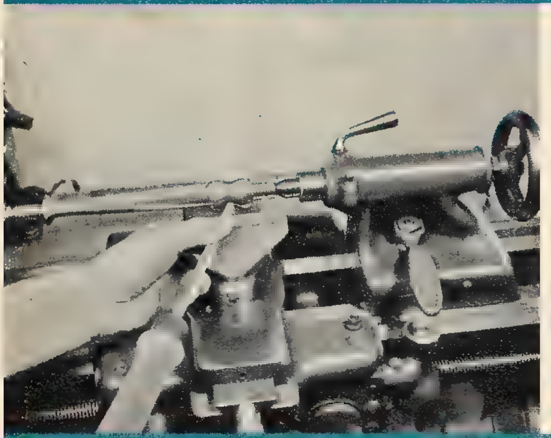




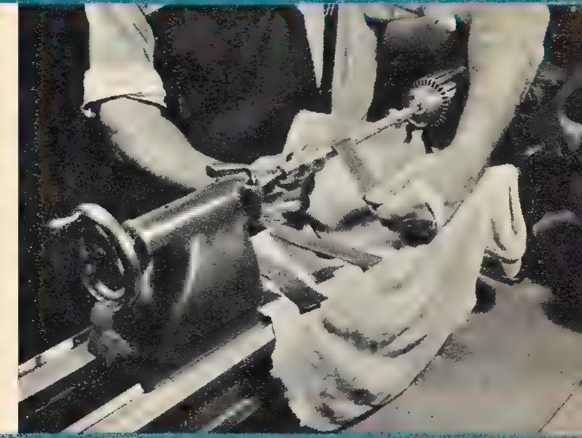
Free end beyond threads is fastened into chuck and unfinished end is held by steady rest. A ½-in. drill is fed to depth of ¾ in. to hold candle.



Since ½ in. is not quite wide enough for most candles, hole must be bored out to about ⅞ in. with this short boring bar, using light cuts.



Carbide-tipped chisel carves curves as bored end of holder is supported by tailstock dead center with a brass plug turned to fit the hole snugly.

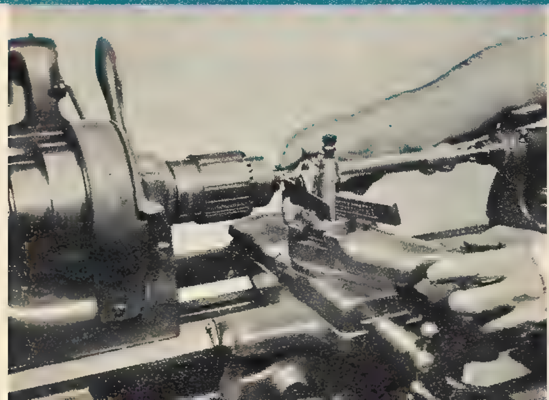


Strips of progressively finer emery cloth provide smooth finish. Use highest spindle speed and slowly move the cloth back and forth across work.

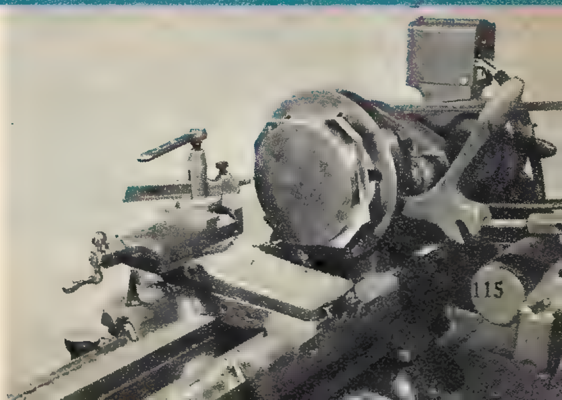
requiring any offset of the tailstock. For our demonstration purposes, we'll do the tapering by hand, with some of the new carbide-tipped hand tools with long handles, just like those found on regular woodturning chisels. We'll use these same tools for making the curves of the candle holder and of the round base. On the market only a relatively short time, carbide-tipped tools are a real boon to the craftsman. Brass, aluminum and various plastics give way to them like so much hard butter. Even iron and steel can be shaped into delicate curves with them if light cuts are taken.

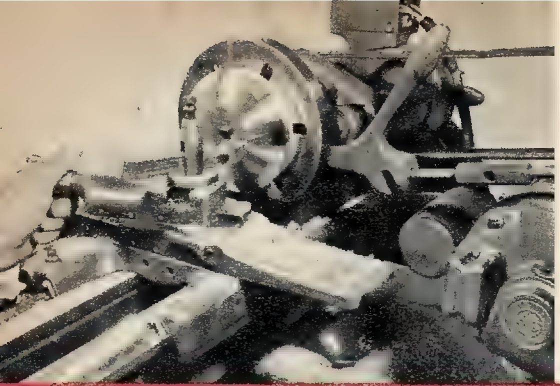
For these hand-forming steps, the com-

Dead stock below threaded end is now removed with a parting tool. Hand is held under rod to catch it as it falls. Touch up end with a file.

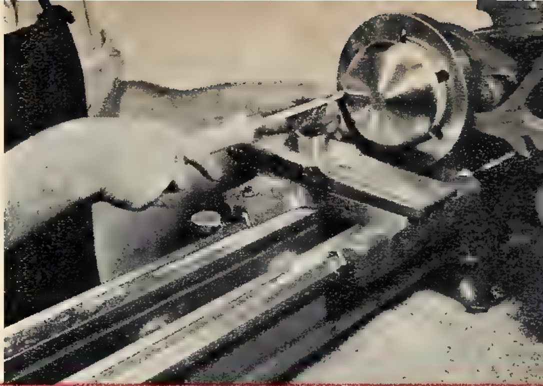


Now for the base. In the faceplate attach flat stock with corners cut to ease turning. Plywood spacer protects plate from possible tool damage.

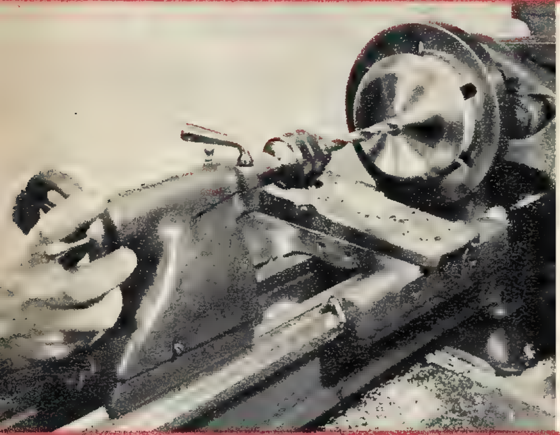




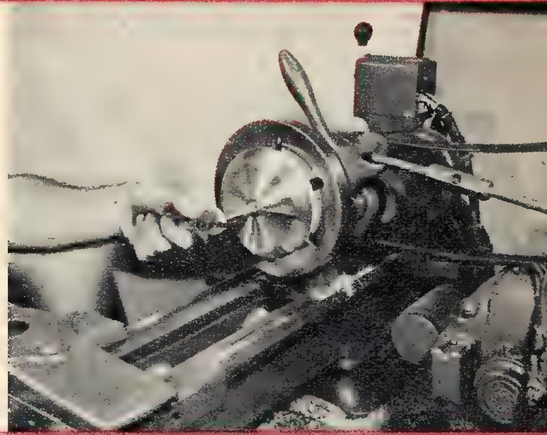
[illegible] base is rounded off, compound rest is set and base is roughly tapered. Although operation could be done with hand tool, [illegible]



Final rounding of base to shape is done with ¼-in. round-nose carbide-tipped chisel supported on T rest. Note tool angle and position of left thumb.

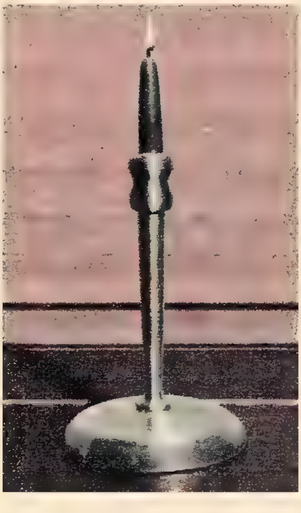


The center hole in the base is now made, but it must be tapped with a [illegible] tap to accept the threaded end of the upright element of the unit.



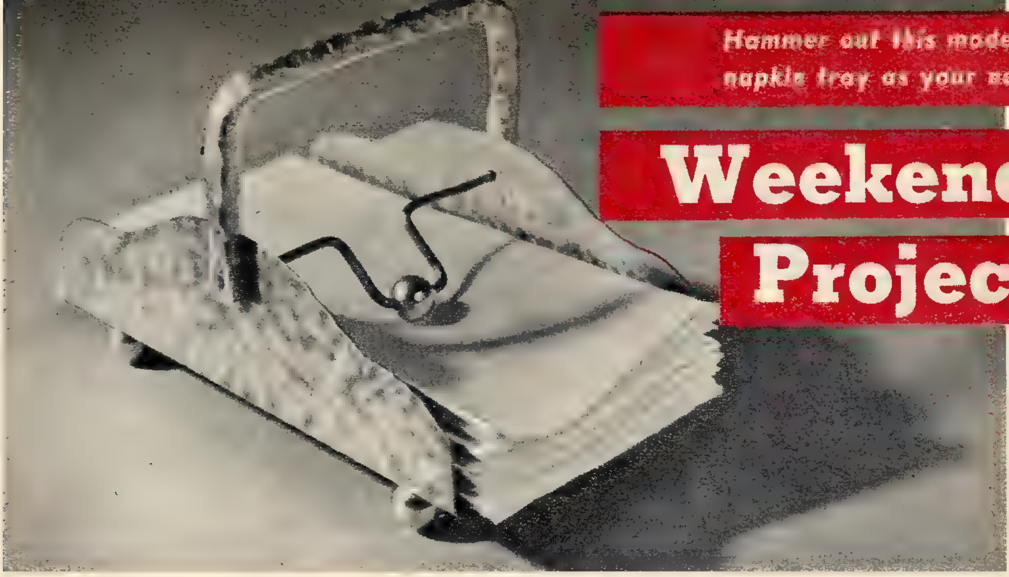
[illegible] Top is [illegible] with a [illegible]. After polishing with emery cloth, remove base, screw units together—and that's it.

pound rest is removed and replaced by a T rest, intended for wood turning. The point of the tool is merely pushed straight into the brass at dead center. It is important of course to keep the body of the tool firmly on the T rest. This is done with the fingers of the left hand, while the right hand adjusts the cut.



In order to make concave or convex shapes with conventional tool bits clamped in the tool post of the compound rest, it is necessary to manipulate the apron hand wheel, the cross feed knob and the compound rest knob, sometimes all simultaneously. This is a good trick—if you can do it at all. But with only a little practice on the carbide tools, you can form delicate curves, beads, indentations, grooves, etc. Lathe owners who use these tools for the first time usually go slightly overboard and put too many curlicues into their work, but that's a pardonable weakness.

You will find that it's not necessary to work on ornate or complicated plans to achieve good-looking results. The project covered here proves that. Although this candlestick was kept simple in both design and construction detail, you'll agree that it's an attractive accessory for any table or mantelpiece. •



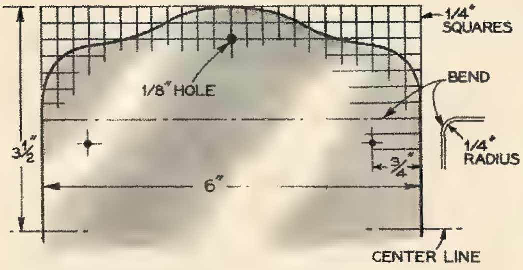
Hammer out this modern napkin tray as your next

Weekend Project

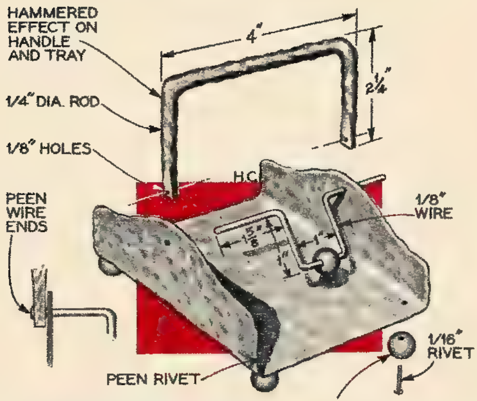
ANY non-ferrous metal that can be polished to a pleasing luster is fine for this job, especially aluminum, copper or brass. If either of the latter two are used they should be lacquered to prevent tarnishing.

To make the tray itself cut a piece of sheet metal 6 in. wide by 7 in. long. Snip out the shape indicated in the diagram below. The handle is made from ¼-in. round rod, which is bent to the contour shown. Hammer both tray and handle, then bend the former between two blocks of wood.

A ½-in. diameter metal ball acts as a weight which keeps napkins in place. It is retained by a length of ⅛-in. wire passed through the center and attached to the tray sides.—*Bertram Brownold* •


1/4" SQUARES
1/8" HOLE
BEND
1/4" RADIUS
3½"
3/4"
6"
CENTER LINE

PATTERN BLANK FOR TRAY

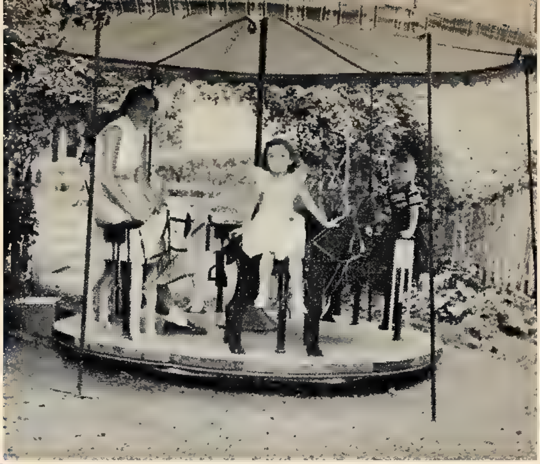

HAMMERED EFFECT ON HANDLE AND TRAY
4"
2¼"
1/4" DIA. ROD
1/8" HOLES
H.C.
PEEN WIRE ENDS
1 5/8"
1"
1/8" WIRE
1/16" RIVET
PEEN RIVET
1/2" STEEL BALL (5)

HAMMERED METAL NAPKIN TRAY

After peening metal, bend between two clamped blocks of wood. Use mallet to get proper angles.

Optional ball feet may be riveted to tray body. These may be turned or bought in hardware store.

WORKBENCH AWARD Winners



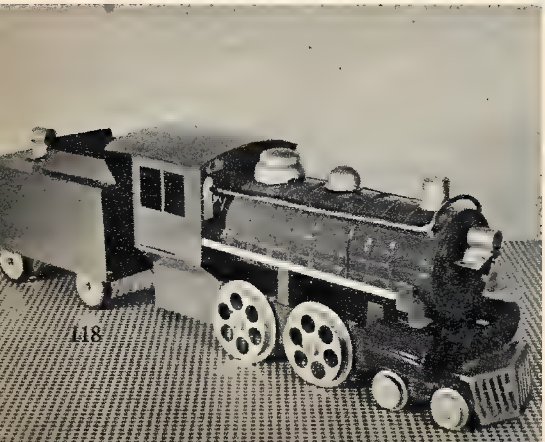
EACH of the craftsmen whose projects are pictured here will receive a $5 check and a *Workbench Award* certificate. Why not send us a photo of *your* latest project? Even if it isn't one of the winners, it may receive a runner-up *Certificate of Merit*. Send entry, with return postage, to

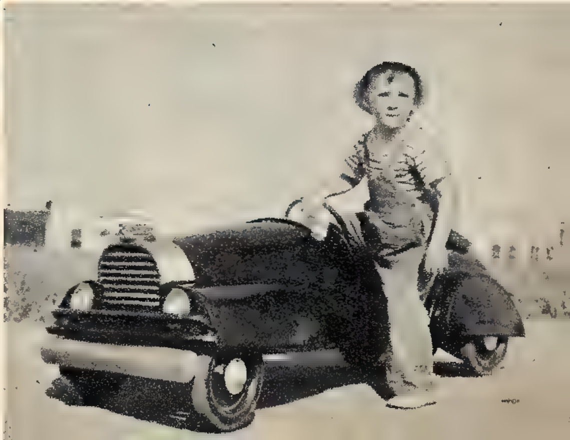
MECHANIX ILLUSTRATED Workbench Awards, 67 W. 44th St., New York 18, N. Y.

Around and Around she-goes. C. P. Parker, an Oakley, Ohio, barber, provided this unique merry-go-round for the kiddies in his neighborhood. Driven by a ¼-hp. motor, the carrousel will carry six passengers. The turntable has a span of eight feet and is covered with a 12-foot canopy. (Data supplied by Roy Tichenor.)

Tin-Can 4-4-0, built by John Janaulis of Grand Rapids, Mich., for his son, is an unusually fine example of what can be done with odds and ends and a little ingenuity. The boiler is made from tomato cans, the steam dome is a Model T hub cap, the sand dome is the top from a grease gun, and the stack, lights, and cylinders are old bushings.

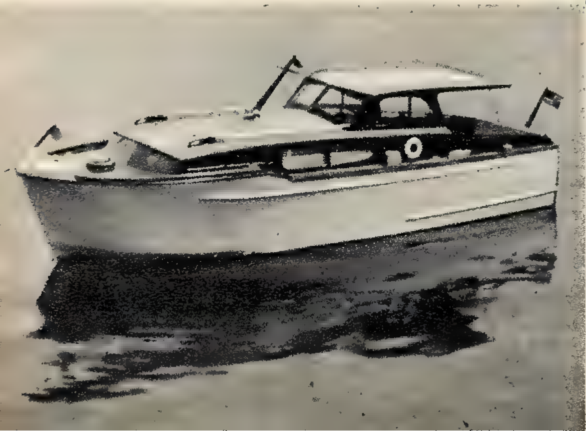
Midget Sport Car. John Melnick, three-year-old son of Stephen Melnick, Pinawa, Canada, is the lucky owner of this fine roadster. His dad writes that the 2x5-ft. aluminum job is driven by a ⅝-hp. Johnson engine, which is geared down to do but 3 mph. Steve spent approximately $60 and took about 250 hours to build it.





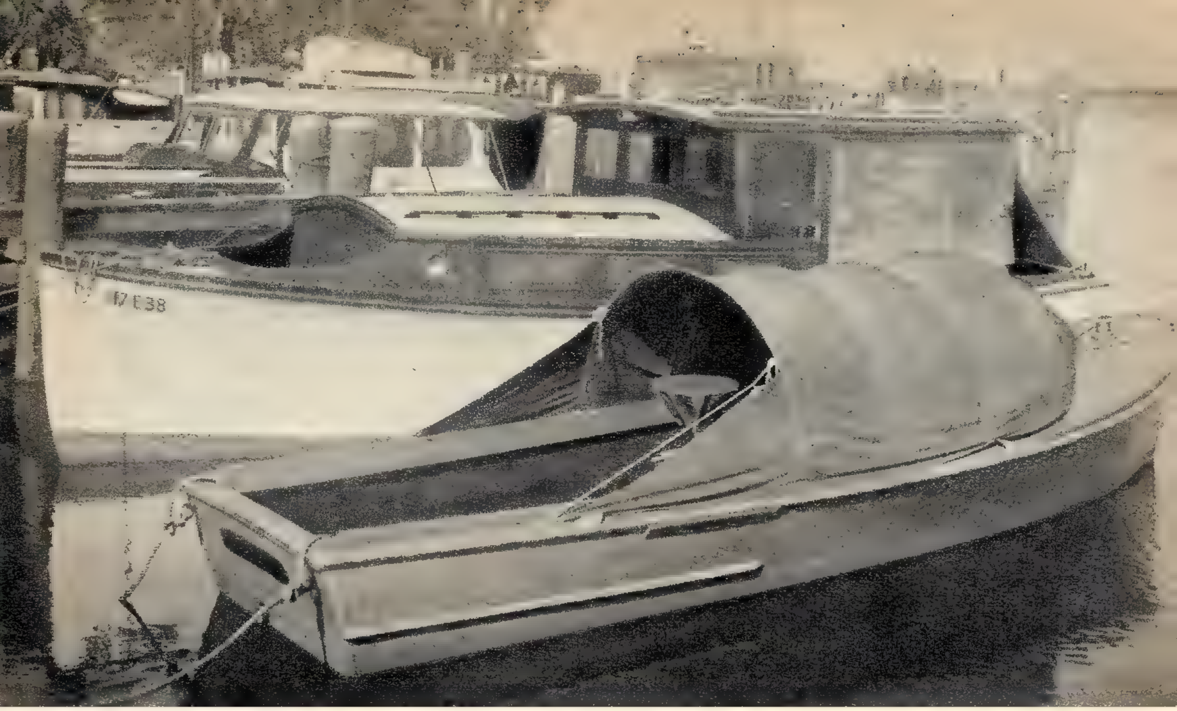
Twin Cabinets, one housing a radio-phonograph combination and the other providing record-storage space, were designed and built by F. F. Attard of Toronto. The cabinets are constructed of ¾-in. mahogany plywood and each is 18x18x34 in. The radio is mounted on two separate chassis and the record player is of the three-speed type.

Model Chris-Craft. One of the most completely detailed models we've ever seen is this 33-in. project recently completed by Eugene Hellmer of Plymouth, Wis. Below decks it has two bunks, a lavatory, a dinette, and a galley. There are even Venetian blinds at the windows. Two small electric motors are used for propulsion.



Let There Be Light decided Joe Salter of Arlington, Ga.—and then he set to work. In the past three years, using material salvaged from the local junk yard and requisitioned from his father's hardware store, he has made over 100 lamps. Give Joe anything from a bird cage to a water tap and he'll transform it into a lamp!

Miniature DC-3. MI Plan No. 391 was used by Ralph Webb of Des Moines when building this beautiful flying scale model of the famous Douglas DC-3. It is powered with two Ohlsson and Rice 23's. The wingspan is 48 in. Ralph installed plastic windows and added a crew and passengers for realism. The finish is silver with black trim.



How to Make a Spray Hood

When the spray flies or the rain falls, you can be dry and comfortable if your boat is equipped with one of these hoods.

IF your boat has a forward deck, by all means make yourself one of these old-and-tried melon-style spray hoods. Either of the types shown will make the boat much more comfortable in rough water, for driven spray will be kept out. In a rain, even the simpler type will provide a protected, dry place to crouch. With the shelter type, the boat can be used for overnight trips—you can load air mattresses and a liquid-fuel camp stove aboard and sleep and eat right on the boat.

Both types use the same principle, of arched bows fitted in pockets in a canvas cover and canvas side wings to hold the hood or shelter erect. With either of them, releasing the wings and shoving the bows forward and down will leave the whole thing folded flat on deck, out of the way but always ready for use.

All the bows should be the same shape and size. This is best determined by using a length of ¼-in. iron rod bent to make a master pattern. If the boat has the usual side decks, shape the rod as in the sketch to have it come outside the coaming. Cut off the ends to give the desired height above deck, usually about two feet. If the boat has no side decks, the sides of the bows should come just over the gunwales so fittings for pivoting the ends can be fastened to the inner sides of the gunwales rather than to the deck. If you are installing a shelter-type hood, the pair of travelers should also be fastened inside the gunwales. This will allow the sides of the hood to extend over the gunwales.

With all bows made from your pattern, and their ends flattened and drilled as shown, make the other needed fittings and fasten the latter to the boat. Then secure the bows in place with pins made from short lengths of $\frac{5}{16}$-in. rod, drilling each end of each pin for a cotter pin.

The cover can be professionally made or you can make it yourself, preferably of khaki or other waterproof duck. If you have a local professional, such as an awning maker, do the job, let him take his own measurements; but if you must order it done by mail from, say, a sailmaking concern, send them patterns as well as measurements. You'll need patterns, too, if you are going to do the work yourself.

When making the patterns (from stiff paper or old canvas), raise all the bows and hold them about in the positions shown by supporting with sticks and twine. Rather than attempt to make the cover from a single piece of material, get it out in sections and sew these together. An ordinary sewing machine fitted with a heavy needle and coarse thread can be used for much of the seaming, but the heavier stitching, where several thicknesses are folded over, must be hand-sewed with a heavy needle and waxed twine.

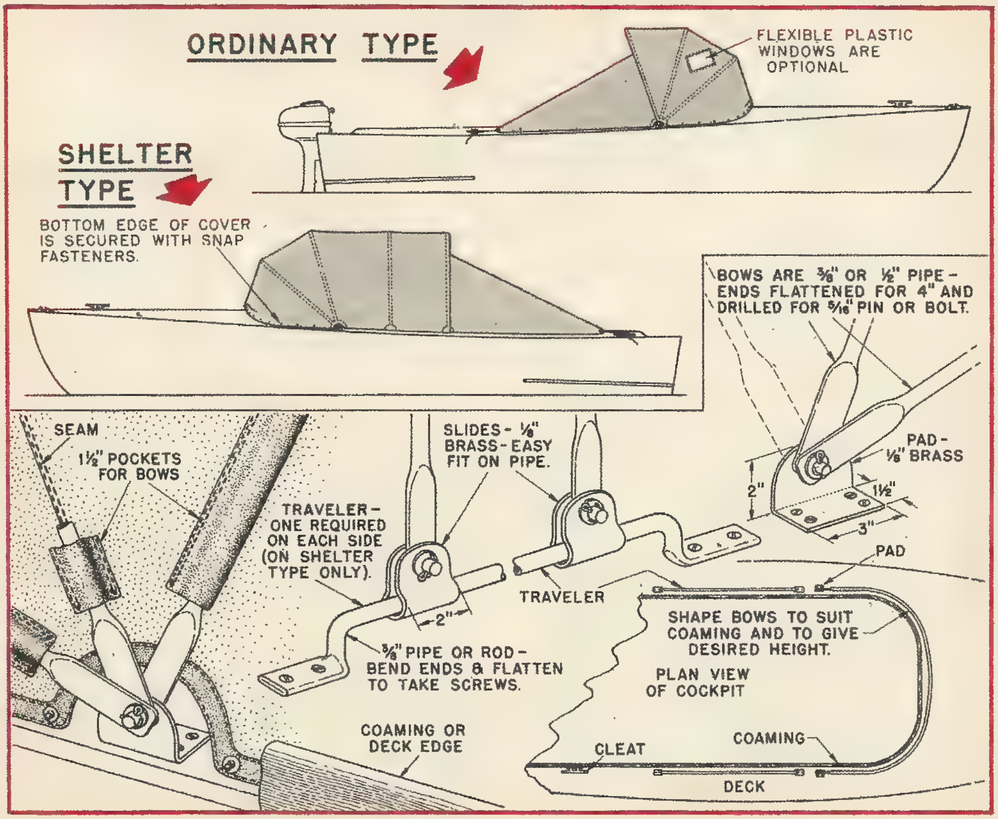
The first pattern to be gotten out is that for the section between the forwardmost bow and the deck. Allow one inch extra along the edge of the bow for seaming and three or four inches along the coaming or deck edge for turning under or hemming to take the snap fasteners that hold the bottom in place. Making sure to have the seams over the erected bows, prepare the remainder of the patterns, with edge allowances as described above. For the shelter-type hood, the straight after part can be in a single section.

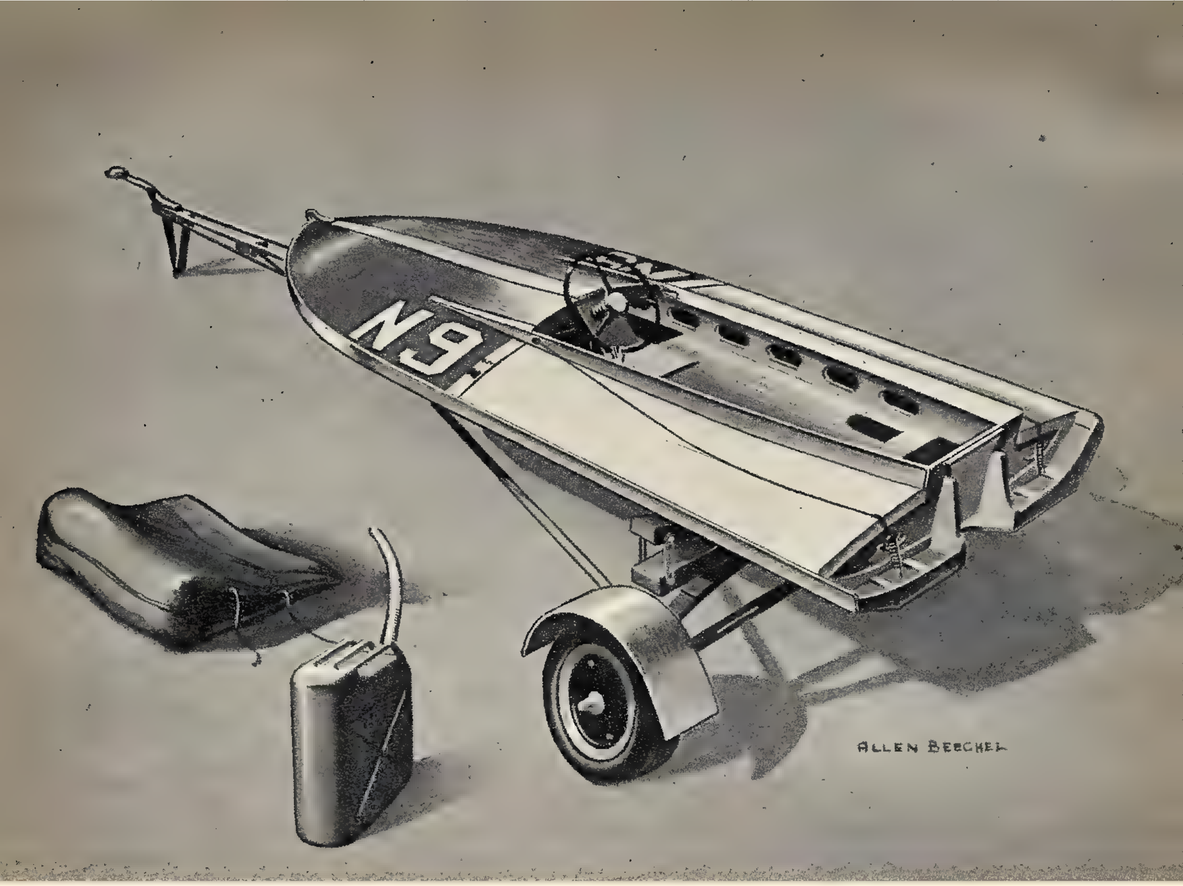
The sections, all but the wings, should then be sewed together. The seams serve as guides when sewing in place the 1½-in. pockets for the bows. Note that these all end well up from the tips to allow the cover to fold down without binding. The after edge of the hood is finished as a 1½-in. hem to take the after bow. Leave enough excess material for this when getting out the pattern.

Remove all the bows from the boat and coax them through their pockets. Put the assembly in place on the boat and adjust the cover to have it set smoothly. This will show how much the edges must be turned under to have them pull down tight. Fold the hems in place and temporarily secure them with pins; then pin the wings in position, adjusting them so the ties attached to their tips, when made fast to cleats, will pull the hood taut.

The whole thing will then have to come off for the final sewing. With this done and the hood is back in place, you're ready to fasten the forward edge. Snap fasteners are used so the hood can be removed from the boat easily at the end of the season.

—*J. A. Emmett.*


ORDINARY TYPE
FLEXIBLE PLASTIC WINDOWS ARE OPTIONAL
SHELTER TYPE
BOTTOM EDGE OF COVER IS SECURED WITH SNAP FASTENERS.
BOWS ARE 3/8" OR 1/2" PIPE - ENDS FLATTENED FOR 4" AND DRILLED FOR 5/16" PIN OR BOLT.
SEAM
1½" POCKETS FOR BOWS
TRAVELER - ONE REQUIRED ON EACH SIDE (ON SHELTER TYPE ONLY).
SLIDES - 1/8" BRASS - EASY FIT ON PIPE.
PAD - 1/8" BRASS
2"
1½"
3"
PAD
TRAVELER
2"
3/8" PIPE OR ROD - BEND ENDS & FLATTEN TO TAKE SCREWS.
SHAPE BOWS TO SUIT COAMING AND TO GIVE DESIRED HEIGHT.
PLAN VIEW OF COCKPIT
COAMING OR DECK EDGE
CLEAT
COAMING
DECK



VAMOOSE...Class B Outboard Hydroplane

Over-all length: 10'-2⅝". Weight: a little over 100 lbs. Beam: 4'-3". Speed: about 50 mph with Class B racing outboard.

By David D. Beach, *Naval Architect*

THE summers of 1949 and 1950 saw the growth of a nationwide interest in outboard-motorboat racing. The majority of those whose interests were aroused started their racing careers with stock utility boats, which are conventional, family-type hulls with ordinary outboard motors, just as delivered from the manufacturers. For the beginner, that combination is satisfactory. For the real racer, however, who has an inherent dislike for the strictly stock type of craft, the hydros are more appealing. And for the man who wants a really hot hull—one that will allow his carefully tuned motor to perform best—this little craft is the answer.

The American Power Boat Association, 700 Canton Drive, Detroit 7, Mich., which is the outfit that registers raceboats and sanctions races, defines a Class B hydroplane as one that weighs at least 100 pounds, including steering gear, motor controls, and permanently attached hardware. The boat is used in combination with a motor having a piston displacement of between 14 and 20 cubic inches.

The hull design of *Vamoose* closely follows several of my previously designed hydroplanes, all of which are enjoying modest success in eastern and midwestern racing circuits. It is a single-step job with a flat after plane that has substantial nontrips and parallel chines. With a 150-pound driver and a really hot motor, the boat is a 50-mph craft and will keep well up in the fleet. She weighs a mite over the minimum of 100 pounds, all the surplus weight being in structural members designed to make the boat capable of taking the rough water of a well-churned race course. The frames are closely spaced and ample battens in the bottom provide a good measure of strength.

Let's look at the lines drawing. The first step in building the boat will be to reproduce this full size on a 4x12-ft. panel of ¼-in. white-painted plywood. Frame lines are on the after faces of the bottom frames. When the full-size lines are completed, frame templates can be made directly on the body plan. Allow for the ¼-in. thickness of the plywood bottom and the laps as indicated on the several framing details. One feature of this boat that makes the construction easier is that the bottom frames from step to transom are identical.

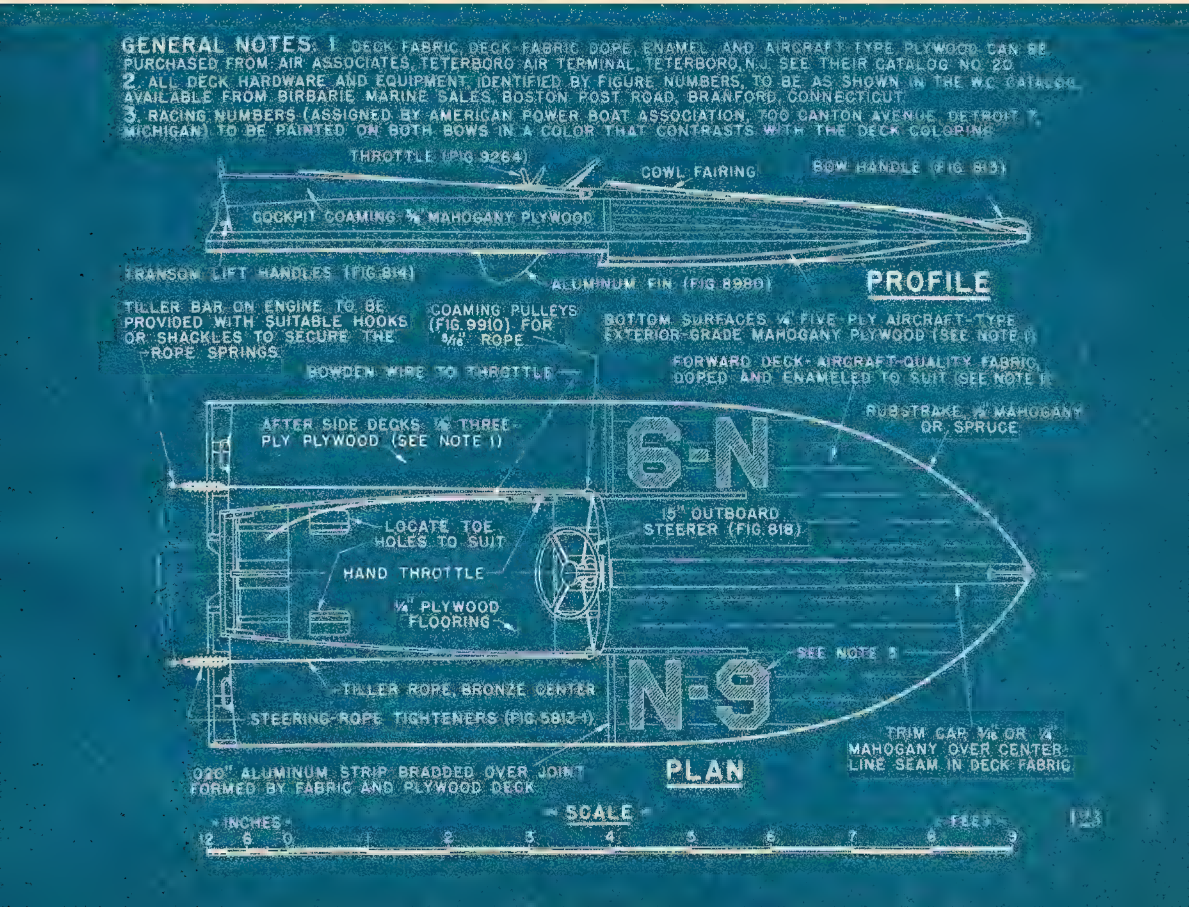
There is a preferred sequence in constructing a hydroplane like this. If it is followed, the boat will be rapidly and easily completed.

(1) In the drawing labeled Assembly Details, note the preliminary-framing sketch. This shows the fixture upon which the boat will be built and the two stringers that are her main structural members. On a piece of two-by-six, erect on edge seven equally spaced one-by-sixes and level, square, and securely chock them in place. Tie strips along their ends will help. Draw a center line from end to end of this fixture.

(2) On the one-by-six crosspieces of the fixture, lay out the curve of the stringers as given on the lines drawing and construction plan. Erect suitable uprights to which you can clamp the stringers.

(3) The stringers are as shown on the construction plan and profile and are of ¾-in. exterior-grade mahogany plywood. They should be templated from the lines layout and carefully cut to shape. Note that the bottoms are perfectly straight from the step aft. Also note that the after ends are raked at the same angle as the ransom. Lightening holes are cut between frames. Care should be taken when cutting these holes to leave at least 2 in. of material above and below the holes and 4 in. between holes.

(4) Remembering that the boat is to be framed upside down, clamp the stringers to the uprights erected on the cross members of the fixture. Take special care that the aft ends are perfectly horizontal be-


GENERAL NOTES: 1 DECK FABRIC, DECK FABRIC DOPE, ENAMEL AND AIRCRAFT TYPE PLYWOOD CAN BE PURCHASED FROM AIR ASSOCIATES, TETERBORO AIR TERMINAL, TETERBORO, N.J. SEE THEIR CATALOG NO. 20
2 ALL DECK HARDWARE AND EQUIPMENT IDENTIFIED BY FIGURE NUMBERS, TO BE AS SHOWN IN THE W.C. CATALOG AVAILABLE FROM BIRBARIE MARINE SALES, BOSTON POST ROAD, BRANFORD, CONNECTICUT
3 RACING NUMBERS (ASSIGNED BY AMERICAN POWER BOAT ASSOCIATION, 700 CANTON AVENUE, DETROIT 7, MICHIGAN) TO BE PAINTED ON BOTH BOWS IN A COLOR THAT CONTRASTS WITH THE DECK COLORING
THROTTLE (FIG 9264)
COWL FAIRING
BOW HANDLE (FIG 813)
COCKPIT COAMING ⅜" MAHOGANY PLYWOOD
TRANSOM LIFT HANDLES (FIG 814)
ALUMINUM FIN (FIG 8980)
PROFILE
TILLER BAR ON ENGINE TO BE PROVIDED WITH SUITABLE HOOKS OR SHACKLES TO SECURE THE ROPE SPRINGS
COAMING PULLEYS (FIG 9910) FOR 5/16" ROPE
BOTTOM SURFACES ¼ FIVE PLY AIRCRAFT-TYPE EXTERIOR-GRADE MAHOGANY PLYWOOD (SEE NOTE 1)
BOWDEN WIRE TO THROTTLE
FORWARD DECK AIRCRAFT-QUALITY FABRIC, DOPED AND ENAMELED TO SUIT (SEE NOTE 1)
RUBSTRAKE ½ MAHOGANY OR SPRUCE
AFTER SIDE DECKS ⅛ THREE-PLY PLYWOOD (SEE NOTE 1)
6-N
LOCATE TOE HOLES TO SUIT
15" OUTBOARD STEERER (FIG 818)
HAND THROTTLE
¼" PLYWOOD FLOORING
SEE NOTE 3
N-9
TILLER ROPE, BRONZE CENTER
STEERING-ROPE TIGHTENERS (FIG 5813-1)
TRIM CAP ⅛ OR ¼ MAHOGANY OVER CENTER LINE SEAM IN DECK FABRIC
.020" ALUMINUM STRIP BRADDED OVER JOINT FORMED BY FABRIC AND PLYWOOD DECK
PLAN
SCALE
INCHES
12 6 0 1 2 3 4 5 6 7 8 9
FEET

cause they determine the flat after plane on which much of the performance depends. Now the work should look like the sketch labeled Preliminary Framing Detail.

(5) Cut the bottom frames from single widths of ⅝-in. spruce. The material should be carefully selected to have straight grain with no checks, cracks, or knots. All the frames from No. 6A at the aft side of the step to No. 11 are identical. The transom frame is similar except for the angle at which it is set. Each frame forward of the step must be made from an individual template. The frame at the forward side of the step (No. 6F) is extra deep, its top coinciding with the top of the frame on the after side of the step (No. 6A).

(6) Carefully locate the frame lines on the stringer bottoms and place the frames in position, starting with No. 6A and working aft to the transom and forward to No. 3. Check the center line of each frame and then fasten a ¾x1½-in. tapered bracket to each stringer and frame as shown in Section C-C. Use plenty of clamps to secure the members while driving the screws. Here and in all other joints in the structure apply good marine glue to the contacting surfaces before securing in place. Immediately after driving the screws, wipe off all excess glue. If it gets a chance to harden, it'll be extremely difficult to remove.

(7) When all the frames that land on the stringers are secured, cut the notches for the keel, which is of spruce, finished ¾x4 in. With the keel properly fastened down into frames No. 3 to 6F and hanging out forward, fasten suitable uprights to the fixture to pull the forward end into its proper curve; then fit the forward frames to the keel. Leave the keel clamped to the uprights until the side strips are fastened to the outboard ends of the frames. Fasten the after section of the keel into frames No. 6A to the transom, using two 1½-in. No. 12 screws at each frame.

(8) When all the frames are fitted and the keel pieces fastened to them, the next piece to be incorporated in the slowly growing structure is the transom. Cut it to the proper shape from a piece of ¾-in. plywood. Secure it to the stringers with 1¼x2-in. oak transom brackets. Drive four 1¾-in. No. 10 screws through the transom into each bracket and two similar fastenings through each stringer into its bracket. Note that the brackets notch over the transom frame. The inside transom knee and outer doubler should be fitted later, after the planking is on.

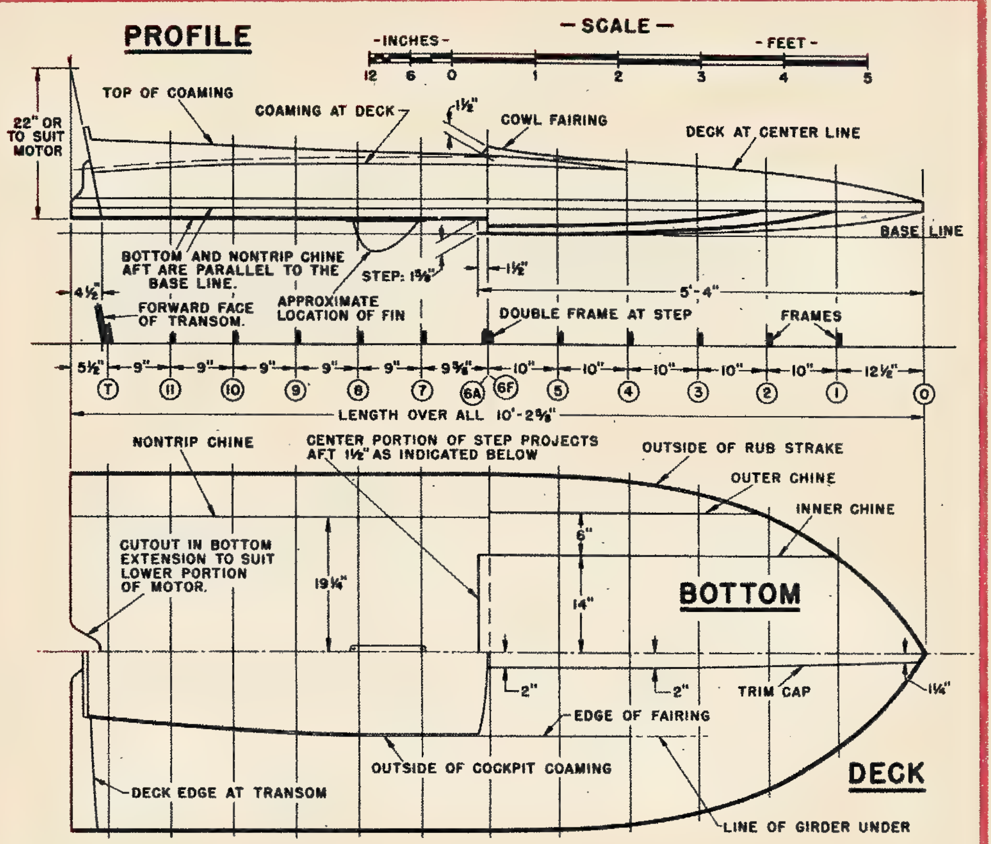
(9) The next step is to install the two 1-in.-thick side strips. These are of a tough, resilient wood such as hemlock or steam-bent oak or spruce. They extend from the nose block to the end of the after planing surface. The nose block should be shaped as shown on the construction plans and rabbeted over the keel. The side strips are beveled together at the center line on the forward end of the nose block and are secured to it with two 1¾-in. No. 12 screws. Fasten each strip to each frame with a single 1¾-in. No. 8 wood screw. Work from forward aft on this job, alternating from one side to the other and boring an undersize hole in each frame for each fastening so as to prevent splitting.

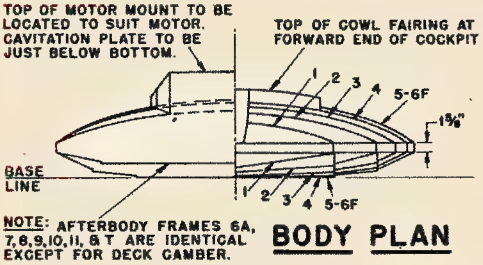
(10) The chine strips are next to be fitted. These are ¾x1¾-in. clear spruce and are notched into the frames and beveled to suit. Note that there are two chines on each side forward of the step and but one on each side aft. The chines forward are butted to, or half-lapped into, the side strips and each is fastened with two 1½-in. No. 8 screws. Use care when beveling to have the chines match the frames, as good landings for the bottom planking are essential for a tight and strong boat. The chines are extended beyond the transom 4½ in., as indicated on the construction plan. At each chine-to-transom joint, put a short length of glue-impregnated cotton wicking between the contacting surfaces. This will help keep the transom tight under the heavy vibration and pounding from the motor.

(11) Fit the ⅝x1¼-in. bottom-stiffening battens into the frames as indicated on the construction plan, extending them beyond the transom like the chines. Lap or butt them to the side strips forward and bevel them on the bottom to permit the planking to lie flush. As you did at the chines, apply cotton wicking to each of the batten-to-transom joints.

(12) The hull is now ready for the planking. Before starting to fit the ¼-in. five-ply aircraft plywood, recheck all beveled members. Since the planking is the tie that holds the bottom together, it must have a good surface to lie on. With a straightedge, make closely spaced athwartship and longitudinal checks. If part of the structure is too high, plane down the offending section; if part is low or hollow, carefully fit a filler and plane it down to the proper height.

(13) The first planking panels to be fitted are the after nontrip planes. These lie between the chines and the side strips and each measures about 7x60 in. Secure them to the side strips, frames, transom, and chines with glue and 1-in. No. 8 flathead wood screws on 2½-in. centers. When the glue has set, plane down the inside edges to provide flush landings for the center


PROFILE
- SCALE -
- INCHES -
- FEET -
12
6
0
1
2
3
4
5
22" OR TO SUIT MOTOR
TOP OF COAMING
COAMING AT DECK
1½"
COWL FAIRING
DECK AT CENTER LINE
BASE LINE
BOTTOM AND NONTRIP CHINE AFT ARE PARALLEL TO THE BASE LINE.
STEP: 1⅝"
1½"
4½"
FORWARD FACE OF TRANSOM.
APPROXIMATE LOCATION OF FIN
5'-4"
DOUBLE FRAME AT STEP
FRAMES
5½"
9"
9"
9"
9"
9"
9⅜"
10"
10"
10"
10"
10"
12½"
T
11
10
9
8
7
6A
6F
5
4
3
2
1
0
LENGTH OVER ALL 10'-2⅝"
NONTRIP CHINE
CENTER PORTION OF STEP PROJECTS AFT 1½" AS INDICATED BELOW
OUTSIDE OF RUB STRAKE
OUTER CHINE
INNER CHINE
CUTOUT IN BOTTOM EXTENSION TO SUIT LOWER PORTION OF MOTOR.
19¼"
6"
14"
BOTTOM
2"
2"
TRIM CAP
1¼"
EDGE OF FAIRING
OUTSIDE OF COCKPIT COAMING
DECK
DECK EDGE AT TRANSOM
LINE OF GIRDER UNDER


TOP OF MOTOR MOUNT TO BE LOCATED TO SUIT MOTOR. CAVITATION PLATE TO BE JUST BELOW BOTTOM.
TOP OF COWL FAIRING AT FORWARD END OF COCKPIT
1
2
3
4
5-6F
1⅝"
BASE LINE
1
2
3
4
5-6F
NOTE: AFTERBODY FRAMES 6A, 7,8,9,10,11, & T ARE IDENTICAL EXCEPT FOR DECK CAMBER.
BODY PLAN

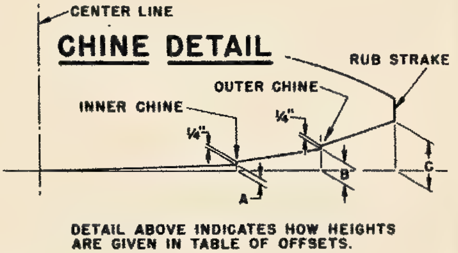

CENTER LINE
CHINE DETAIL
RUB STRAKE
OUTER CHINE
INNER CHINE
¼"
¼"
A
B
C
DETAIL ABOVE INDICATES HOW HEIGHTS ARE GIVEN IN TABLE OF OFFSETS.

TABLE OF OFFSETS

OFFSETS GIVEN IN INCHES AND EIGHTHS OF INCHES
TO OUTSIDE OF PLANKING AND TO TOP OF DECK.

FRAME NUMBER	1	2	3	4	5	6-F	6-A	7	8	9	10	11	T
— HALF BREADTHS —													
RUB STRAKE	13-7	19-4	23-0	24-5	25-3	25-4	← STRAIGHT →						25-4
COCKPIT COAMING							12-0	12-0	12-0	11-6	11-2	10-4	9-6
— HEIGHTS ABOVE BASE LINE —													
KEEL AT CENTER LINE	1-4	0-6	0-2	0-1	0-0	0-0	1-5	← STRAIGHT →					1-5
INNER CHINE "A"		1-6	0-6+	0-2	0-0	0-0							
OUTER CHINE "B"			2-1	1-3	1-1	1-1							
RUBBING STRAKE "C"	3-6	← STRAIGHT →											3-6
CENTER LINE OF DECK	8-0	9-2	10-0	10-5	10-7	11-0	11-0	11-0	11-0	10-7	10-6	10-3	9-5

panel, which is a single sheet from chine to chine. Take special care to see that this sheet fits snugly against the after face of the deep frame at the step. The edges at the chines are left square, as indicated on the sections, and the after end extends beyond the transom frame as shown. Use ample glue and clamps along the landing at the transom and stagger the fastenings into the transom and transom frame. Make certain that the plywood is pulled down hard on the transom frame and that a tight joint is obtained. This is where the boat takes the worst pounding and leaks are most likely to develop. Two staggered rows of fastenings are driven into the keel, one on each side of the center line.

(14) The bottom planking forward of the step is made up of six panels instead of three. These panels are fitted in the same order as those aft of the step, working from the sides in toward the center line. The chines are parallel to the center line, so fitting the panels will be simple. The center panels, as you will notice from the upside-down view of the completed bottom, extend 1½ in. aft of the step. This allows air to get in behind the step, quickly killing suction drag. Take special care when fitting the center panels to have the plywood land square and full on the bottom of frame No. 6F. Like the transom, this is where leaks are prone to develop, so a bit of extra attention is warranted.

There are just a couple of little items to be taken care of before the bottom will be completed. First, fit a filler and five brackets beneath the forward-step extension, as shown on Section D-D. The ¼-in. mahogany-plywood filler strip is 1⅜x28 in. It is glued and screwed in place and should bear snugly against the forward and after-plane bottom planking. Do not force it into place, but carefully plane it to fit. The five brackets help keep the step aligned and the limber holes in them allow proper step ventilation. Place each outer bracket about 3 in. from the edge and space the remainder equally.

Second, trim off the planking panels so they are flush with the outside edges of the side strips. Since you are edge-planing plywood, go at it carefully and slowly.

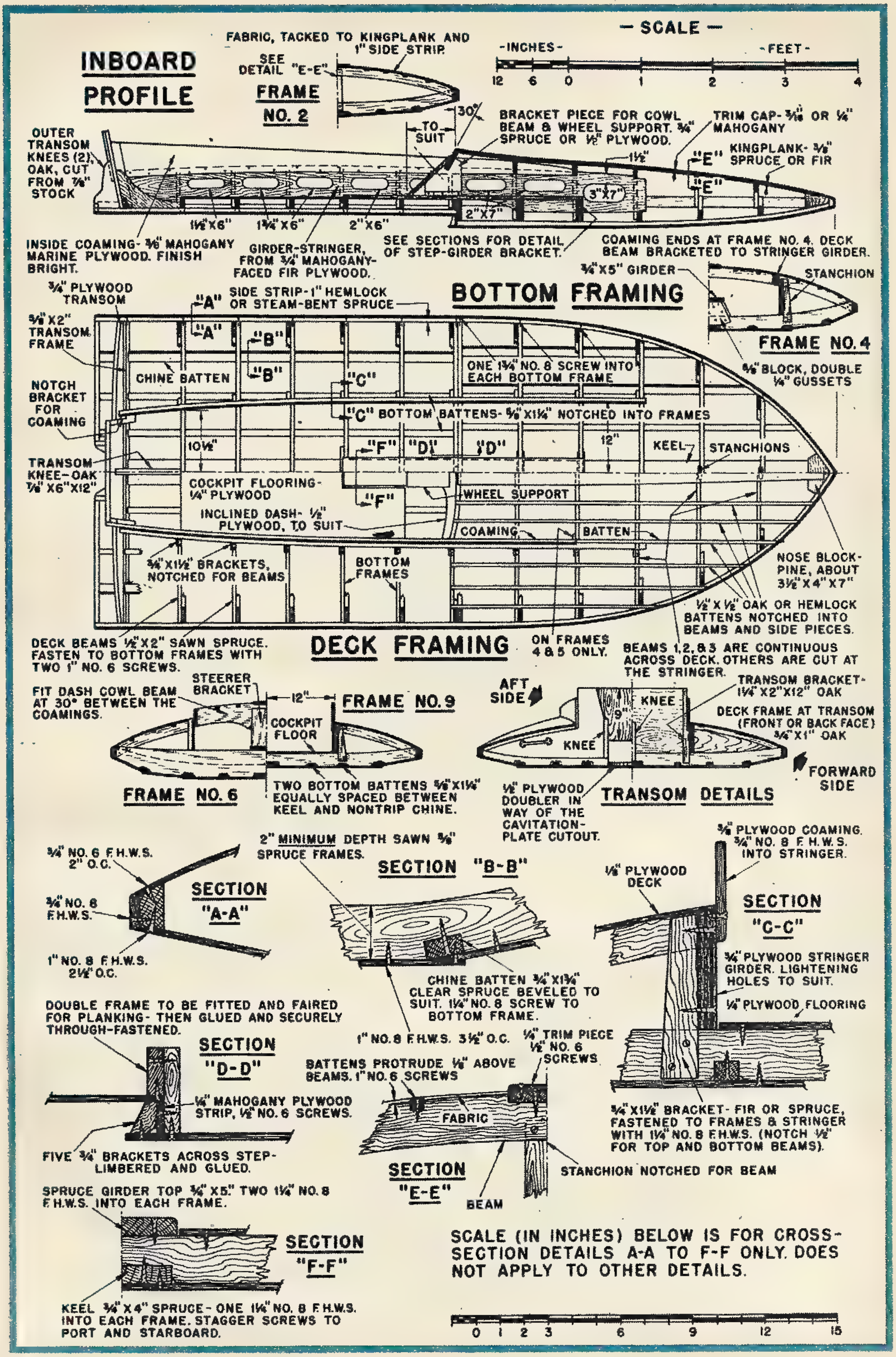
(15) Before going on with the construction, the entire bottom will have to be sanded smooth, first with a medium-grit paper and finally with a fine paper. Carefully fill all the depressions over the screw heads with a good filler such as Wood-Dough. Apply it liberally with a stiff putty knife, pressing it down into the slot of each screw. Let it dry overnight.

(16) Since there are about 700 screws in the bottom of the boat, you have about 700 filled holes to be smoothed off. Sounds discouraging, doesn't it? It really isn't too bad, so let's go to work. Wrap a piece of coarse paper on a suitably shaped sanding block and, using fore-and-aft strokes, start in. The coarse paper will knock off the high spots and clean up the traces of remaining glue. Then, when you feel satisfied with the looks of things, switch to the lighter stuff and go over the bottom again. The best smoothness gauge you can use is the palm of your hand—an occasional pass of your palm over the work will advise you as to your progress. When further effort brings no further noticeable increase in smoothness, the job is finished. Carefully wipe off the dust and sweep up the chips and shavings on the floor because next we tackle the bottom varnish. Nothing is more detrimental to the "skin you love to touch" than dust in the air when varnish is going on; so do a good job of cleaning up.

(17) When the dust has settled, put on a coat of filler and follow that with a sealer. Use non-grain-raising types, checking after they are dry for roughness of the surface. You may have to sand the bottom lightly again—you be the judge of that. Apply the first coat of varnish and let it dry well, allowing at least a couple of days. When dry, lightly sand it down with very fine paper and apply the next coat.

(18) After the second coat is dry, unclamp the boat from the fixture, carefully turn it over, and place it on a pair of well-padded horses. Saw the deck beams from ½-in. spruce, as indicated on the sections, and secure them to the after faces of the bottom frames with glue and three 1-in. screws at each joint. Attention is directed to the note on the construction plan indicating that only beams Nos. 1, 2, and 3 are continuous from side to side. The remainder of the beams in the forward deck are cut for the stringers. Small chocks are fitted on the stringers to provide landings for the beam ends. Section C-C shows a detail through the short beams in way of the cockpit and indicates that the brackets are notched at the top to permit the beams to land solidly. Two ¾-in. No. 8 screws are driven through the top of each bracket into each beam.

Note on the construction plan that the cockpit coamings extend from the transom to the beam on frame No. 4. These are cut from ⅜-in. mahogany plywood and are 6 in. deep at the transom, tapering to 1½ in. deep at frame No. 4. They are fastened to the tops of the stringers as shown in Sec-


INBOARD PROFILE
FABRIC, TACKED TO KINGPLANK AND 1" SIDE STRIP.
SEE DETAIL "E-E"
FRAME NO. 2
— SCALE —
-INCHES-
-FEET-
12 6 0 1 2 3 4
30°
TO SUIT
BRACKET PIECE FOR COWL BEAM & WHEEL SUPPORT. ¾" SPRUCE OR ½" PLYWOOD.
TRIM CAP- 5/16 OR ¼" MAHOGANY
KINGPLANK- ⅜" SPRUCE OR FIR
1½"
"E"
"E"
OUTER TRANSOM KNEES (2), OAK, CUT FROM ⅞" STOCK
3"X7"
2"X7"
1½"X6"
1¾"X6"
2"X6"
INSIDE COAMING- ⅜" MAHOGANY MARINE PLYWOOD. FINISH BRIGHT.
GIRDER-STRINGER, FROM ¾" MAHOGANY-FACED FIR PLYWOOD.
SEE SECTIONS FOR DETAIL OF STEP-GIRDER BRACKET.
COAMING ENDS AT FRAME NO. 4. DECK BEAM BRACKETED TO STRINGER GIRDER.
¾"X5" GIRDER
STANCHION
FRAME NO. 4
⅝" BLOCK, DOUBLE ¼" GUSSETS
¾" PLYWOOD TRANSOM
⅝"X2" TRANSOM FRAME
"A"
SIDE STRIP- 1" HEMLOCK OR STEAM-BENT SPRUCE
BOTTOM FRAMING
"A"
"B"
"B"
CHINE BATTEN
"C"
ONE 1¾" NO. 8 SCREW INTO EACH BOTTOM FRAME
NOTCH BRACKET FOR COAMING
"C" BOTTOM BATTENS- ⅝"X1¼" NOTCHED INTO FRAMES
10½"
12"
"F"
"D"
"D"
KEEL
STANCHIONS
TRANSOM KNEE- OAK ⅞" X6"X12"
COCKPIT FLOORING- ¼" PLYWOOD
"F"
WHEEL SUPPORT
INCLINED DASH- ½" PLYWOOD, TO SUIT
COAMING
BATTEN
¾"X1½" BRACKETS, NOTCHED FOR BEAMS
BOTTOM FRAMES
NOSE BLOCK- PINE, ABOUT 3½"X4"X7"
½"X½" OAK OR HEMLOCK BATTENS NOTCHED INTO BEAMS AND SIDE PIECES.
DECK BEAMS ½"X2" SAWN SPRUCE. FASTEN TO BOTTOM FRAMES WITH TWO 1" NO. 6 SCREWS.
DECK FRAMING
ON FRAMES 4 & 5 ONLY.
BEAMS 1, 2, & 3 ARE CONTINUOUS ACROSS DECK. OTHERS ARE CUT AT THE STRINGER.
FIT DASH COWL BEAM AT 30° BETWEEN THE COAMINGS.
STEERER BRACKET
12"
FRAME NO. 9
COCKPIT FLOOR
AFT SIDE
9"
KNEE
KNEE
TRANSOM BRACKET- 1¼" X2"X12" OAK
DECK FRAME AT TRANSOM (FRONT OR BACK FACE) ¾"X1" OAK
FORWARD SIDE
FRAME NO. 6
TWO BOTTOM BATTENS ⅝"X1¼" EQUALLY SPACED BETWEEN KEEL AND NONTRIP CHINE.
½" PLYWOOD DOUBLER IN WAY OF THE CAVITATION-PLATE CUTOUT.
TRANSOM DETAILS
2" MINIMUM DEPTH SAWN ⅝" SPRUCE FRAMES.
¾" NO. 6 F.H.W.S. 2" O.C.
SECTION "A-A"
¾" NO. 8 F.H.W.S.
1" NO. 8 F.H.W.S. 2½" O.C.
SECTION "B-B"
⅜" PLYWOOD COAMING. ¾" NO. 8 F.H.W.S. INTO STRINGER.
⅛" PLYWOOD DECK
SECTION "C-C"
CHINE BATTEN ¾"X1¾" CLEAR SPRUCE BEVELED TO SUIT. 1¼" NO. 8 SCREW TO BOTTOM FRAME.
¾" PLYWOOD STRINGER GIRDER. LIGHTENING HOLES TO SUIT.
¼" PLYWOOD FLOORING
DOUBLE FRAME TO BE FITTED AND FAIRED FOR PLANKING- THEN GLUED AND SECURELY THROUGH-FASTENED.
SECTION "D-D"
1" NO. 8 F.H.W.S. 3½" O.C.
¼" TRIM PIECE ½" NO. 6 SCREWS
BATTENS PROTRUDE ⅛" ABOVE BEAMS. 1" NO. 6 SCREWS
¼" MAHOGANY PLYWOOD STRIP, ½" NO. 6 SCREWS.
FABRIC
¾"X1½" BRACKET- FIR OR SPRUCE, FASTENED TO FRAMES & STRINGER WITH 1¼" NO. 8 F.H.W.S. (NOTCH ½" FOR TOP AND BOTTOM BEAMS).
FIVE ¾" BRACKETS ACROSS STEP-LIMBERED AND GLUED.
SECTION "E-E"
STANCHION NOTCHED FOR BEAM
BEAM
SPRUCE GIRDER TOP ¾"X5" TWO 1¼" NO. 8 F.H.W.S. INTO EACH FRAME.
SECTION "F-F"
SCALE (IN INCHES) BELOW IS FOR CROSS-SECTION DETAILS A-A TO F-F ONLY. DOES NOT APPLY TO OTHER DETAILS.
KEEL ¾"X4" SPRUCE- ONE 1¼" NO. 8 F.H.W.S. INTO EACH FRAME. STAGGER SCREWS TO PORT AND STARBOARD.
0 1 2 3 6 9 12 15

tion C-C and must be fitted before installing the center deck beams on frames Nos. 4 and 5 and the inclined dashboard at frame No. 6. Note that the center portions of the last three deck beams in the forward deck are lifted slightly (see section at frame No. 6) to form a cowl. The inclined dash is cut from ½-in. plywood and should be of ample depth to take the speedometer. End fastenings through the coaming secure the dash until the steerer bracket can be installed between it and the step girder, which will be fitted later.

(19) Next, finish up the transom. Note on the construction plan and on the transom detail that two knees are fitted on the after side of the transom, one either side of the cutout in the bottom extension. As indicated on the lines plan, that cutout is made to suit your motor. It should be just large enough to permit the motor to swivel without hitting the bottom extension. Before the knees can be fitted, stiffeners, sawed from ¾-in. oak and notched for the bottom battens and chine, are fastened at the after end of the bottom extension. Secure each stiffener to its adjacent side strip with two 1½-in. No. 8 screws and to the bottom planking with 1-in. No. 6 screws on 3-in. centers. Fasten each knee with four 2-in. No. 10 screws driven through the transom, two 1-in. No. 8 screws through the bottom planking, and one 2½-in. No. 10 screw through the stiffener. Fit a ½-in. plywood doubler between the knees on top of the bottom planking and a second doubler on the transom itself. Secure each doubler with glue and a quilting of screws. Cut small limber holes in the knees and in the stiffeners at the battens and chine to let water drain out of the bottom extension as the boat gets underway.

(20) The step-girder top is a piece of ¾x5-in. spruce, 41 in. long, which is fastened to the tops of frames No. 8, 7, 6A, and 6F and to the tops of the brackets on frames No. 5 and 4. These brackets are detailed on the section at frame No. 4 and are simply blocks that are double-gusseted to the frames with ¼-in. plywood. The girder ties the forward and after planes together. See Section F-F for fastening details.

(21) Now let's tackle the foredeck battens. These are ½x½-in. hemlock, oak, or spruce, spaced equally from the ⅜-in. spruce king plank to the deck edges and are parallel to the center line. The king plank and battens protrude ⅛ in. above the deck beams. Temporarily tack them down while you check for fairness, which is important as high or low spots will cause the fabric decking to wrinkle. When certain that all is smooth and fair, permanently fasten the battens and king plank in place.

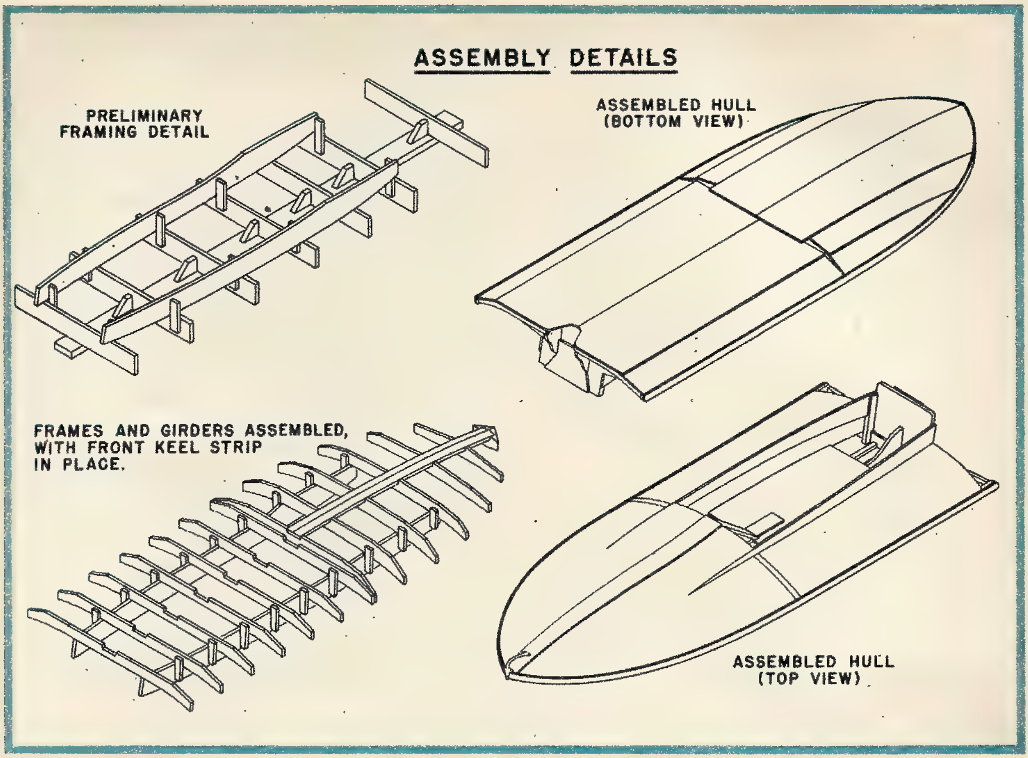
(22) Before closing in the boat with decking, clean the inside structure and give it a couple of coats of varnish. Nothing works quite so well for cleaning out the dust from between the frames as a good tank-type vacuum cleaner.

(23) Now you're ready to put on the decking. The ⅛-in. plywood after deck goes on first. Carefully cut each side to fit from the transom to the beam on frame No. 6. Spread glue on the stringer tops, beams, and side strips and clamp the decking in place. Fasten it with ¾-in. No. 6 screws, spacing them 2 in. apart in the stringers and side strips and 3 in. apart in the beams.

The fabric deck forward is put on one side at a time, with a seam on the center line. Secure one piece along the center line with copper or Monel tacks on 1½-in. centers. Pulling the fabric taut, stretch it over the edge of the side strip and tack it down from the stem to about frame No. 4. No tacks are to be driven into either the beams or the battens. Next, carefully stretch the fabric over the cowling battens from frames No. 4 to No. 6. When there are no wrinkles, drive a line of tacks into the top of each coaming forward of the dash. This will permit you to cut the fabric carefully along the outer edges of the coamings and tack the loose edges to the stringers below. Now repeat the stretch-and-tack procedure for the remainder of the side, back to frame No. 6. Tack the after end of the cloth along the inclined dash and to the top of the plywood after deck at frame No. 6. The final touch is to glue on some pinked gummed tape along the coaming-stringer cut, over the tacks. Repeat this process on the other side.

Finish the fabric with a couple of coats of good fabric dope, followed by two or more coats of colored lacquer. This is where you can come forward with a distinctive color scheme. There are no rules on the subject except that your racing numbers must be of a contrasting color to the deck. The after deck and coaming are varnished, of course, and the name of the boat is applied over the varnish.

Now she's complete except for the trimmings. Fit the wheel bracket, the inside transom knee, and the ¼-in. plywood flooring and ceiling; then add the hardware and trim. The fin is located about as shown, but may be moved a couple of inches forward or aft to suit your own ideas. The throttle is placed where shown on the deck plan. The wheel should be tried in several loca-


ASSEMBLY DETAILS
PRELIMINARY FRAMING DETAIL
ASSEMBLED HULL (BOTTOM VIEW)
FRAMES AND GIRDERS ASSEMBLED, WITH FRONT KEEL STRIP IN PLACE.
ASSEMBLED HULL (TOP VIEW)

tions on its bracket to determine the most comfortable position. That may take several runs to determine.

That's about all. You built it—now race it; but before entering competition, get lots of practice. Engage in impromptu races whenever possible. Good luck and good racing! ●

LARGE-SCALE PLANS

will greatly simplify construction. Send $3 to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut, Please specify Plan No. B-193.

LUMBER LIST

(Approximate Quantities Required)

Exterior-Grade Mahogany Plywood

Cockpit Coaming: 1 sheet, 3/8" x 12" x 7'-0"
Dashboard, Transom Doubler, and Bottom-Extension Doubler: 1 sheet, 1/2" x 24" x 24"
Stringers and Transom: 1 sheet, 3/4" x 4'-0" x 8'-0"

Aircraft-Type Mahogany Plywood

After Side Decks: 1 sheet, 1/8" x 4'-0" x 6'-0"
Planking, Flooring, Ceiling, Gussets, and Step Strip: 3 panels, 1/4" x 4'-0" x 6'-0"

Specify that all wood listed below is to be used for boatbuilding and is to be air-dried to a maximum of 15% moisture content. All hardwood is to consist of first, second, and select grades only. All softwood is to consist of A and B grades only.

Spruce

King Plank: 1 piece, S2S 3/8", 5" wide, 5'-6" long
Deck Beams: 4 pieces, S2S 1/2", 6" wide, 10'-0" long
Bottom Battens: 2 pieces, S4S 5/8" x 1 1/4", 16'-0" long
Step-Girder Brackets: 2 pieces, S2S 5/8", 2" wide, 7" long
Bottom Frames: 60 lineal ft., S2S 5/8", 6" wide
Step Brackets: 1 piece, S4S 3/4" x 1 3/8", 12" long
Chines: 2 pieces, S4S 3/4" x 1 3/4", 14'-0" long
Keel: 1 piece, S4S 3/4" x 4", 12'-0" long
Step-Girder Top and Steerer Bracket: 1 piece, S4S 3/4" x 5", 5'-0" long

Fir or Spruce

Stanchions: 1 piece, S4S 3/4" x 1 1/2", 6'-0" long
Brackets: 2 pieces, S2S 3/4", 2" wide, 10'-0" long

Pine

Nose Block: 1 piece, about 3 1/2" x 4" x 7"

White Oak

Transom Deck Beam and Bottom-Extension Stiffeners: 1 piece, S2S 3/4", 4" wide, 7'-0" long
Transom Knees: 1 piece, S2S 7/8", 6" wide, 3'-0" long
Transom Brackets: 2 pieces, S4S 1 1/4" x 2", 12" long

Hemlock, Oak, or Spruce

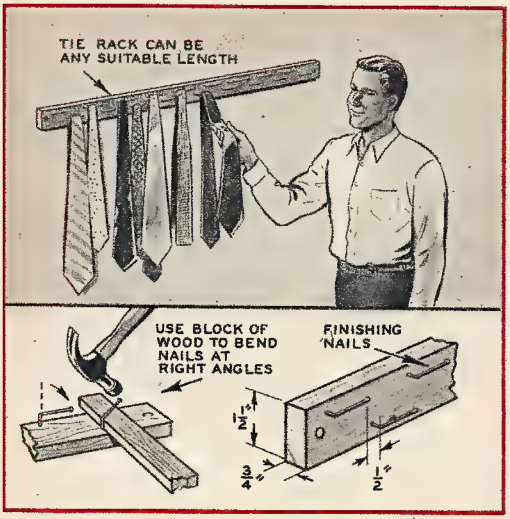
Deck Battens: 6 pieces, S4S 1/2" x 1/2", 10'-0" long
Side Strips: 2 pieces, S2S 1", 2 1/2" wide, 16'-0" long

Mahogany

Trim Cap: 1 piece, S2S 1/4", 5" wide, 5'-6" long

Mahogany or Spruce

Rubstrakes: 2 pieces, S2S 1/2", 2" wide, 16'-0" long

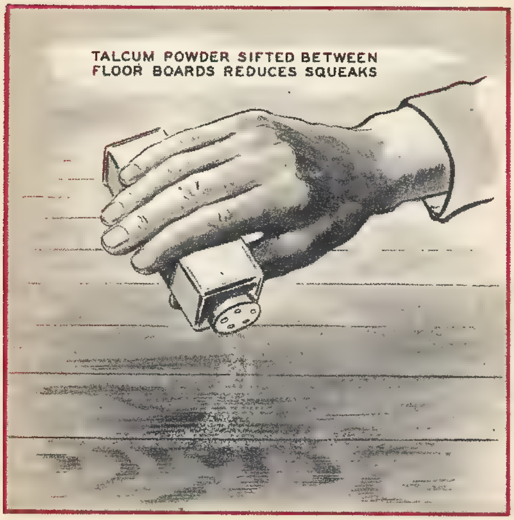

TIE RACK CAN BE ANY SUITABLE LENGTH
USE BLOCK OF WOOD TO BEND NAILS AT RIGHT ANGLES
FINISHING NAILS
1½"
¾"
½"

Simple tie rack. This has no moving parts to wear out and does not use any hard to get materials. A piece of wood with finishing nails driven in and bent to one side and painted, does the trick.

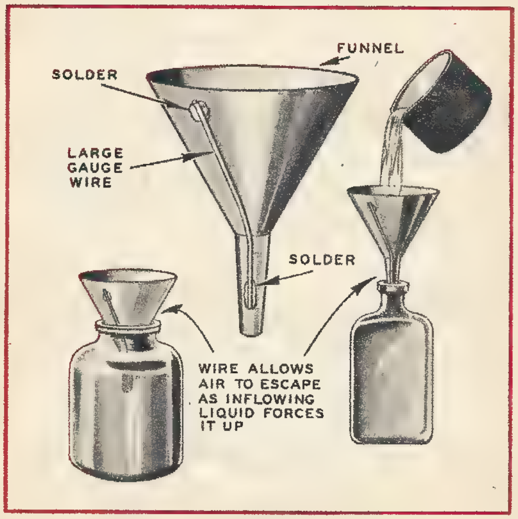
A check to find out how much liquid remains in that butane tank. When the tank is relatively cool pour about a gallon of water, just as warm as your hand will comfortably bear, down the outside of the tank.

around

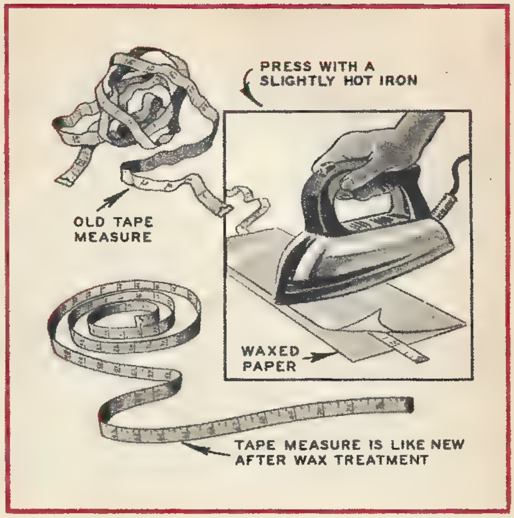
Stop squeak. Is that creaking floor getting on your nerves? It's sometimes caused by the rubbing of one floor board against another. They can often be stopped from squeaking by sifting talcum powder.


TALCUM POWDER SIFTED BETWEEN FLOOR BOARDS REDUCES SQUEAKS

Wire on funnel allows the air to escape from the neck of a bottle. A piece of large gauge wire, such as solid galvanized clothes line, soldered to the side of a funnel will solve your pouring problems very quickly.


FUNNEL
SOLDER
LARGE GAUGE WIRE
SOLDER
WIRE ALLOWS AIR TO ESCAPE AS INFLOWING LIQUID FORCES IT UP

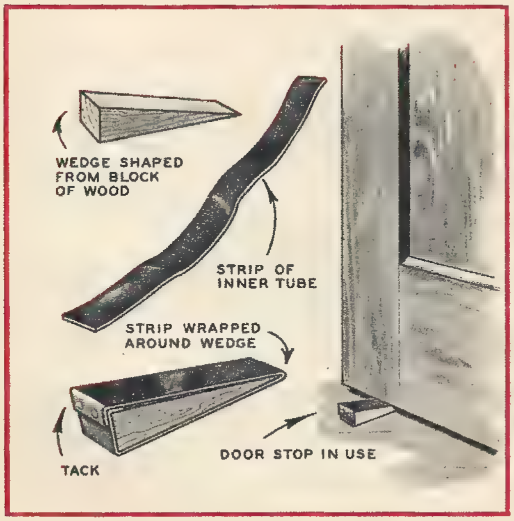
After pouring the water on the tank, wait about ten or fifteen seconds, then run your hand slowly down the side of the tank. Quite a sharp change in the temperature will easily be felt at the liquid level.


PRESS WITH A SLIGHTLY HOT IRON
OLD TAPE MEASURE
WAXED PAPER
TAPE MEASURE IS LIKE NEW AFTER WAX TREATMENT

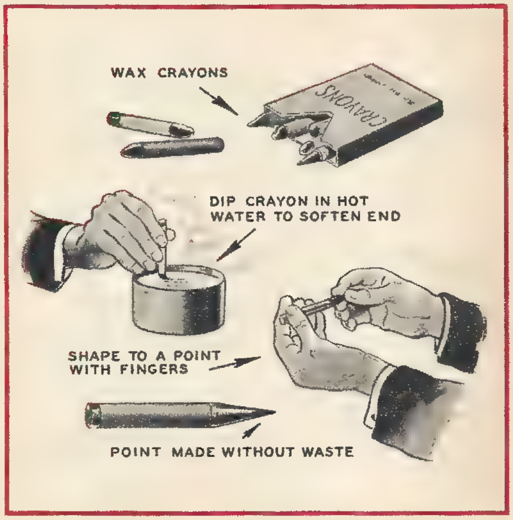
New life for the limp tape measure. You can give it a new lease on life again if you place it between two sheets of waxed paper and press it with a slightly hot iron. It will be stiff and easy to use once more.

the house

To make a good door stop use a wedge shaped board and a strip of inner tube. Stretch the rubber strip tightly around the thin end of the wedge and tack the ends firmly to the thick end, as shown below.


WEDGE SHAPED FROM BLOCK OF WOOD
STRIP OF INNER TUBE
STRIP WRAPPED AROUND WEDGE
TACK
DOOR STOP IN USE

Economical way to sharpen wax crayons, is to get a can of hot water and dip the crayon's tip in it for a minute or two. You can then easily shape them into a good point. They will last longer and work better.


WAX CRAYONS
CRAYONS
DIP CRAYON IN HOT WATER TO SOFTEN END
SHAPE TO A POINT WITH FINGERS
POINT MADE WITHOUT WASTE

Sikorsky Amphibian

The finished model after it had successfully completed twelve test flights with no mishaps.

This twenty-eight-inch free flight scale model is a sterling perfomer over land or lake. Power with any .020 to .049 engine.

By Dick Ealy

A WHOLE new field of model building was created by the production of the baby engines which are especially good for powering scale model flying ships. We decided to build a model of the Sikorsky S-38. It satisfied the desired qualities of good appearance, with a high wing for stability and simple construction. The general appearance of the original plane has been retained, but some small changes have been made for simplicity and to improve the model's performance.

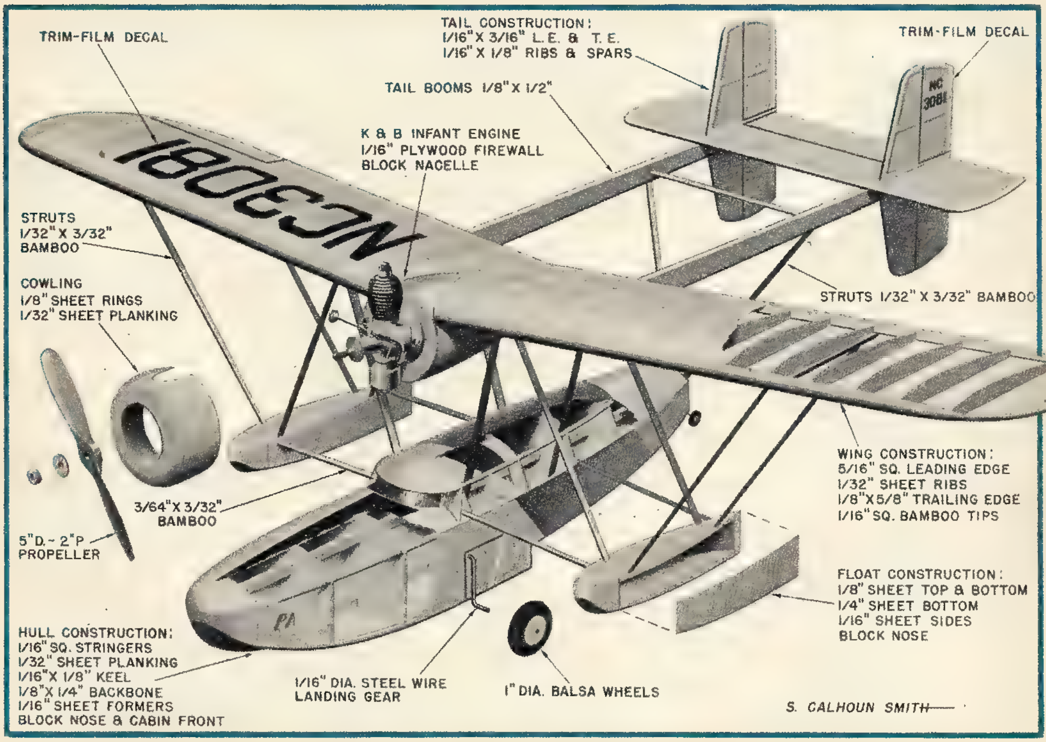
Igor Sikorsky's flying boats were both rugged and reliable, so that quite often they were chosen for pioneering new air routes. It was the Sikorsky S-38 that Colonel Charles A. Lindbergh used on his Central American trail blazing flight for the Pan-American Airways.

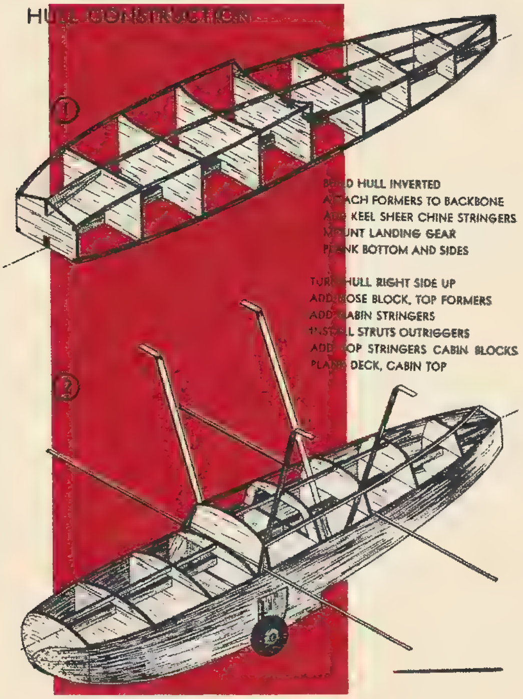
Study the drawings and read the instructions carefully before starting construction.

Start to work on the hull first. It is built inverted on the top view of the drawing. Cut out $\frac{1}{16}$ in. sheet formers and place in the proper position over the ⅛x¼ in. backbone spar. Make sure the formers are vertical while the cement drys. Next cement $\frac{1}{16}$x⅛ in. keel from B to the tail end. A piece of $\frac{1}{16}$ in. sheet is used for the keel from A to B. Place the $\frac{1}{16}$ in. square sheer and chine stringers and cement well. Make the retractable landing gear and install as shown in detail. Plank bottom of hull with 1/32x3 in. sheet balsa. Work forward from E with another piece. Make paper templates of cut-out for landing gear on the side planking. Slip side panel, made from 1/32x2 in. stock, over gear and cement in place. Now you can lift the hull from the board and turn right side up. Cement formers AT, BT, etc. in place. The dash board is the same as CT. Add the cabin stringers made from 1/16 in. square balsa. Make the tail post from 1/16x⅛ in.

Split bamboo is the best for the main struts. Bend as shown over a candle flame or gas jet. You might substitute .040 in. steel piano wire. Cement these struts with several coats of cement. Mount the outrigger bamboo or .040 in. wire as struts as indicated in the plan. Place the 1/16x⅛ in. top stringer in its place and cement it. Plank deck and cabin top with 1/32x3 in. sheet balsa. Cement oversize nose block and the fore and aft cabin blocks in place. Trim on assembly as illustrated. Sandpaper the entire hull with some No. 4/0 sandpaper and then brush on two thin coats of clear dope, then sand again. Cover hull with Jap tissue and give it three coats of thin silver dope, sanding it between each coat. Cement .010 in. celluloid windshield and windows on last.

Make the wing next. Cut the ribs as indicated and assemble the frame on a flat surface. Omit the center rib until later. The wing tip should be made of bamboo. Bend a piece 1/16x⅛ in. over a flame and split to make two identical tips. Balsa tips made of 1/16 in. sheet may also be used. Notch spars at the center and crack, to form 9/16 in. dihedral at each tip. Add 1/16 in. sheet balsa gussets and flush bottom inserts for boom and nacelle attachment. Round off the leading edge and sandpaper the frame. Mount the wing as shown in attachment detail. The bottom of the wing and the base line should be parallel. Make the tail booms from ⅛x½ in. stock and taper as shown. Cover them with Jap tissue and clear dope. Give them three coats of thin silver dope, sanding lightly between each coat. The horizontal tail and two vertical rudders are made next and covered with yellow Jap tissue. Brush on two thin coats of thin clear dope. Cement both booms in place on the bottom of the tail. Slip the vertical rudders over the tail from the rear and cement them in place. Mount the boom and the tail assembly to the underside of the wing. There should be zero incidence between the tail and wing under surface.


TRIM-FILM DECAL
TAIL CONSTRUCTION:
1/16" X 3/16" L.E. & T.E.
1/16" X 1/8" RIBS & SPARS
TRIM-FILM DECAL
NC 3081
TAIL BOOMS 1/8" X 1/2"
K & B INFANT ENGINE
1/16" PLYWOOD FIREWALL
BLOCK NACELLE
NC3081
STRUTS
1/32" X 3/32"
BAMBOO
COWLING
1/8" SHEET RINGS
1/32" SHEET PLANKING
STRUTS 1/32" X 3/32" BAMBOO
WING CONSTRUCTION:
5/16" SQ. LEADING EDGE
1/32" SHEET RIBS
1/8"X5/8" TRAILING EDGE
1/16" SQ. BAMBOO TIPS
3/64"X 3/32"
BAMBOO
5"D.- 2"P
PROPELLER
FLOAT CONSTRUCTION:
1/8" SHEET TOP & BOTTOM
1/4" SHEET BOTTOM
1/16" SHEET SIDES
BLOCK NOSE
PA
HULL CONSTRUCTION:
1/16" SQ. STRINGERS
1/32" SHEET PLANKING
1/16"X 1/8" KEEL
1/8"X 1/4" BACKBONE
1/16" SHEET FORMERS
BLOCK NOSE & CABIN FRONT
1/16" DIA. STEEL WIRE
LANDING GEAR
1" DIA. BALSA WHEELS
S. CALHOUN SMITH


HULL CONSTRUCTION
①
BUILD HULL INVERTED
ATTACH FORMERS TO BACKBONE
ADD KEEL SHEER CHINE STRINGERS
MOUNT LANDING GEAR
PLANK BOTTOM AND SIDES
TURN HULL RIGHT SIDE UP
ADD NOSE BLOCK, TOP FORMERS
ADD CABIN STRINGERS
INSTALL STRUTS OUTRIGGERS
ADD TOP STRINGERS CABIN BLOCKS
PLANK DECK, CABIN TOP
②

Carve the engine nacelle and hollow it out as shown. Make the firewall from $\frac{1}{16}$ in. plywood and drill to fit your motor. Attach your engine to the firewall. Give both surfaces several thin coats of cement before cementing the firewall to the nacelle permanently. Cover the nacelle with strips of Jap tissue and clear dope. Brush on three thin coats of silver dope and sand between each coat. Use the same cementing procedure in attaching the nacelle to the wing bottom as used for the firewall.

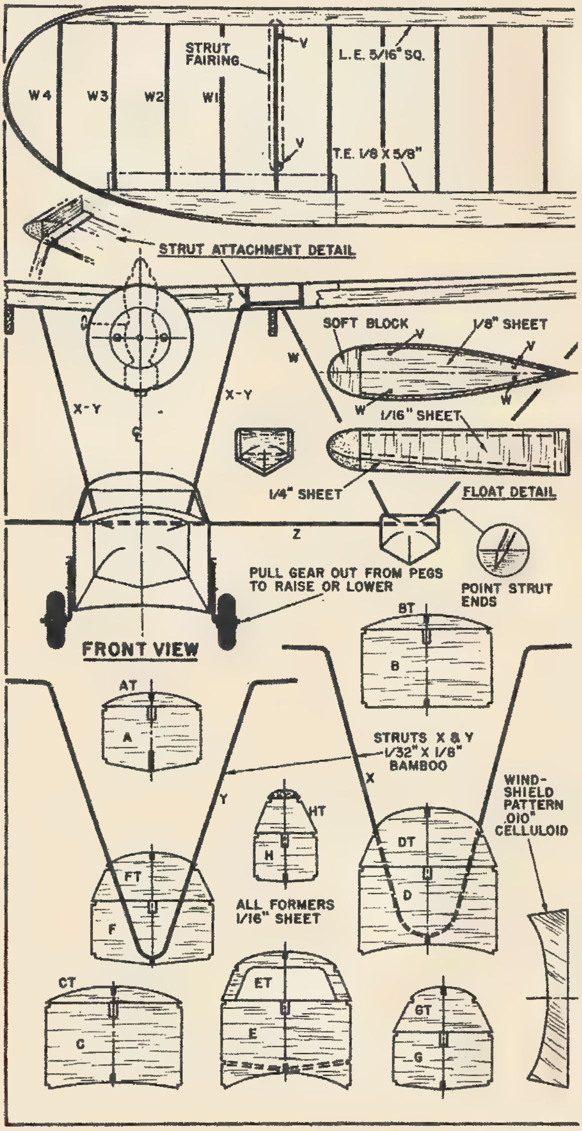
Cover the wing frame with yellow Jap tissue and shrink with water before brushing on four thin coats of clear dope. Make balsa engine cowl and cover with tissue and clear dope. Give it three coats of thin silver dope and attach to the tank as shown.

Build the floats inverted and cover them with tissue and clear dope and then apply three thin coats of silver dope. Attach the outrigger struts and add the remaining struts and paint them silver. Cement the tail wheel to the rear end of the hull.

Decorations such as the Pan-American insignia, window frames, ailerons, rudder and stablizer, outlines and license can be cut from black tissue or Trim-Film decal. A coat of hot-fuel proofer over the entire model will preserve the plane much longer and it is recommended. The original model balanced at ⅓ of wing chord. Glide by hand over grass before you make a power flight to check its balance and stability. A little right rudder may be used to circle the model. Hand launch your model for test flights before trying flights from ground or flights from water. The ship will climb fairly fast and glide nicely so be ready to chase your flying boat.

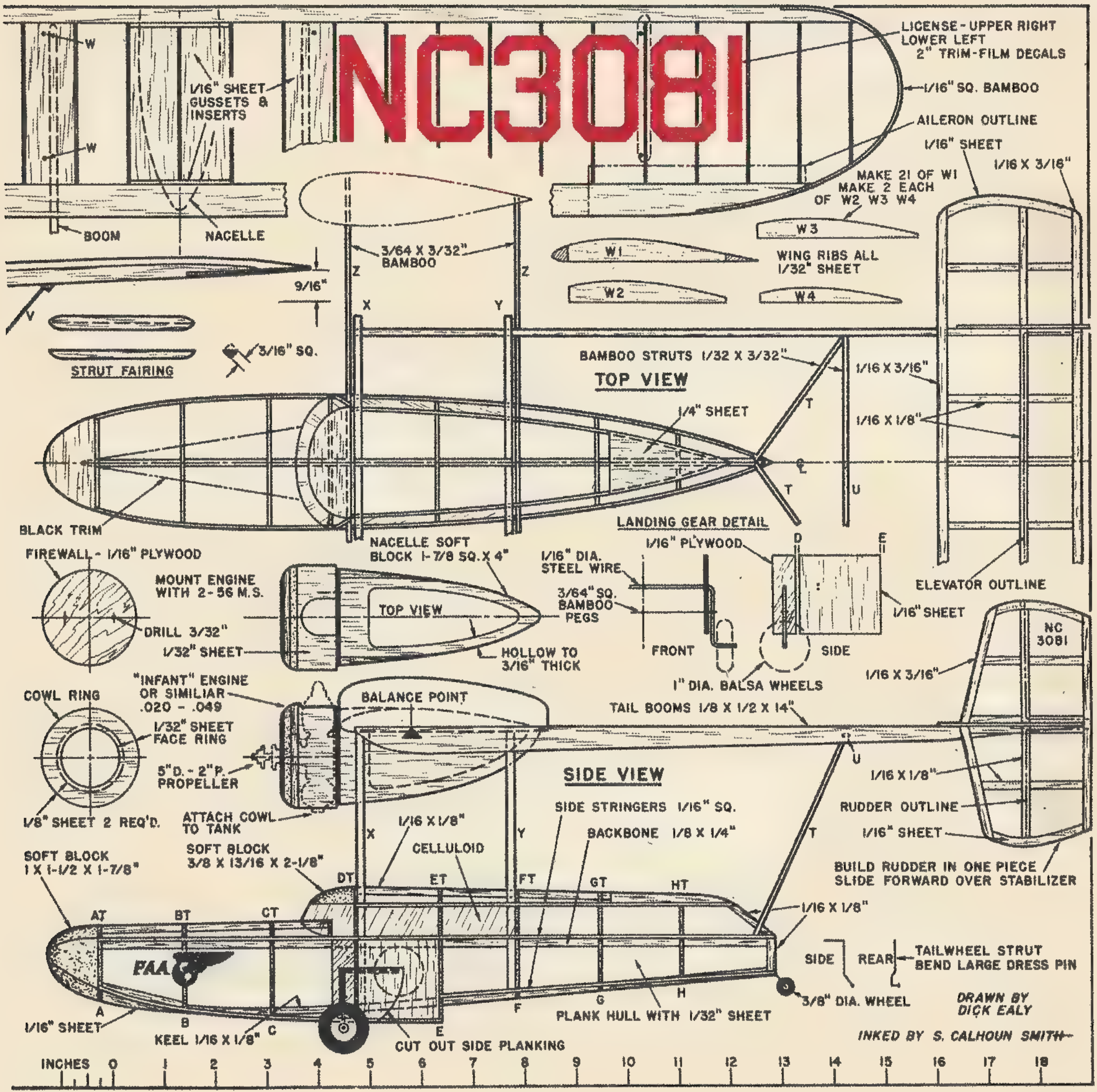
FULL-SIZE PLANS

of this model can be obtained by sending 50c to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 421.


STRUT FAIRING
V
L.E. 5/16" SQ.
W4
W3
W2
W1
V
T.E. 1/8 X 5/8"
STRUT ATTACHMENT DETAIL
SOFT BLOCK
1/8" SHEET
V
W
W
X-Y
X-Y
W
1/16" SHEET
℄
1/4" SHEET
FLOAT DETAIL
Z
PULL GEAR OUT FROM PEGS TO RAISE OR LOWER
POINT STRUT ENDS
FRONT VIEW
BT
B
AT
A
STRUTS X & Y 1/32" X 1/8" BAMBOO
X
Y
HT
H
WIND-SHIELD PATTERN .010" CELLULOID
DT
D
FT
F
ALL FORMERS 1/16" SHEET
CT
C
ET
E
GT
G

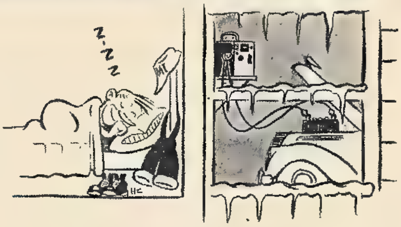
Hand launch your model on its test flights before you try ground or water flights to check stability and avoid accidents.

One of the important things to remember when flying your scale model plane is the same thing that pilots of all amphibians worry about, the landing gear. You can get into as much trouble on a smaller scale if you have the gear in the wrong position for a landing. More than one pilot has had quite a surprise as he tore the belly out of his plane by not having the gear down. •



NC3081
LICENSE - UPPER RIGHT
LOWER LEFT
2" TRIM-FILM DECALS
1/16" SQ. BAMBOO
AILERON OUTLINE
1/16" SHEET
1/16 X 3/16"
MAKE 21 OF W1
MAKE 2 EACH
OF W2 W3 W4
W
W
1/16" SHEET
GUSSETS &
INSERTS
BOOM
NACELLE
3/64 X 3/32"
BAMBOO
Z
Z
X
Y
W3
W1
W2
W4
WING RIBS ALL
1/32" SHEET
9/16"
V
STRUT FAIRING
3/16" SQ.
BAMBOO STRUTS 1/32 X 3/32"
TOP VIEW
1/4" SHEET
1/16 X 3/16"
1/16 X 1/8"
T
T
U
BLACK TRIM
FIREWALL - 1/16" PLYWOOD
MOUNT ENGINE
WITH 2-56 M.S.
DRILL 3/32"
1/32" SHEET
NACELLE SOFT
BLOCK 1-7/8 SQ. X 4"
TOP VIEW
HOLLOW TO
3/16" THICK
LANDING GEAR DETAIL
1/16" DIA.
STEEL WIRE
3/64" SQ.
BAMBOO
PEGS
1/16" PLYWOOD
D
E
FRONT
SIDE
1" DIA. BALSA WHEELS
ELEVATOR OUTLINE
1/16" SHEET
NC
3081
1/16 X 3/16"
"INFANT" ENGINE
OR SIMILIAR
.020 - .049
COWL RING
1/32" SHEET
FACE RING
5"D. - 2"P.
PROPELLER
1/8" SHEET 2 REQ'D.
ATTACH COWL
TO TANK
BALANCE POINT
TAIL BOOMS 1/8 X 1/2 X 14"
SIDE VIEW
U
1/16 X 1/8"
RUDDER OUTLINE
1/16" SHEET
BUILD RUDDER IN ONE PIECE
SLIDE FORWARD OVER STABILIZER
SIDE STRINGERS 1/16" SQ.
BACKBONE 1/8 X 1/4"
1/16 X 1/8"
CELLULOID
X
Y
T
SOFT BLOCK
1 X 1-1/2 X 1-7/8"
SOFT BLOCK
3/8 X 13/16 X 2-1/8"
DT
ET
FT
GT
HT
AT
BT
CT
1/16 X 1/8"
PAA
SIDE
REAR
TAILWHEEL STRUT
BEND LARGE DRESS PIN
A
B
C
E
F
G
H
1/16" SHEET
KEEL 1/16 X 1/8"
CUT OUT SIDE PLANKING
PLANK HULL WITH 1/32" SHEET
3/8" DIA. WHEEL
DRAWN BY
DICK EALY
INKED BY S. CALHOUN SMITH
INCHES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

battery charger

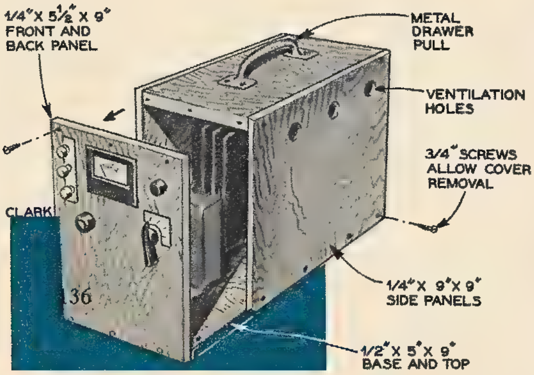


Winter weather is no threat if you make this heavy-duty unit, which also doubles as a variable low-voltage supply plant.

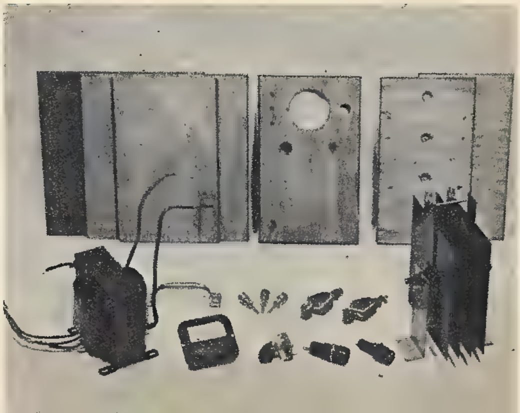
A sudden cold snap has descended overnight. As you open the garage door with shaking fingers you recall that you haven't been doing much driving, and you pray under your breath that the battery still has enough strength to kick over the motor. As you timidly press the starter button your fears are realized: all you hear is a short, stifled groan as the congealed oil in the crankcase and the stiff grease in the transmission succeed in resisting the weak efforts of the starting motor.

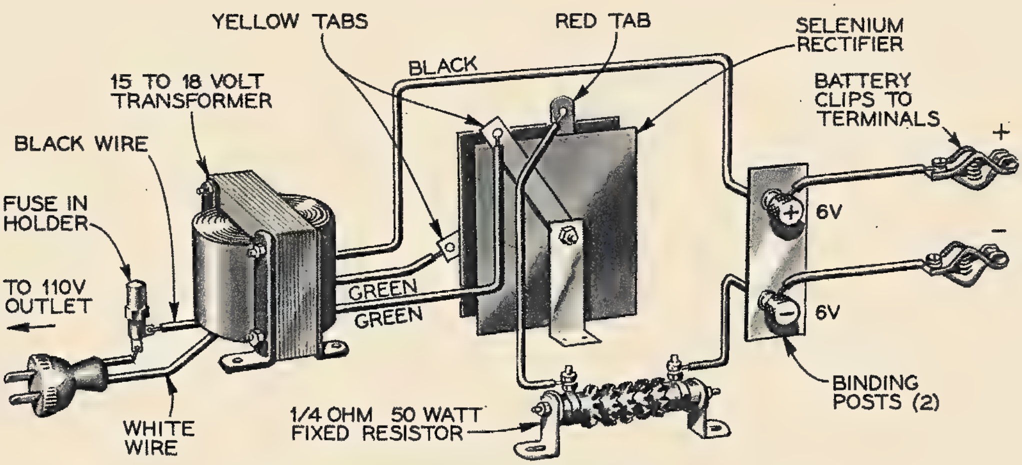
You won't go through this exasperating experience again [*Continued on page* 184]

The convenient carrying case is built from ½-in. and ¼-in. plywood. Finish with a coat of shellac.

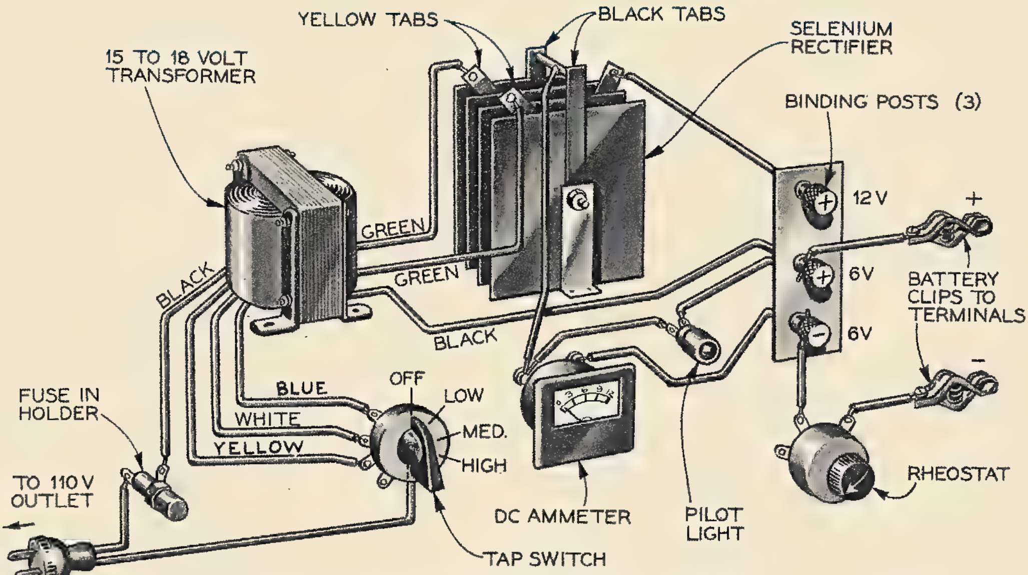

1/4"X 5½"X 9" FRONT AND BACK PANEL
METAL DRAWER PULL
VENTILATION HOLES
3/4" SCREWS ALLOW COVER REMOVAL
1/4"X 9"X 9" SIDE PANELS
1/2"X 5"X 9" BASE AND TOP
CLARK

The main charger parts before assembling. Note series of ventilation holes on panel at right.




YELLOW TABS
RED TAB
SELENIUM RECTIFIER
BLACK
15 TO 18 VOLT TRANSFORMER
BATTERY CLIPS TO TERMINALS
+
BLACK WIRE
FUSE IN HOLDER
6V
−
TO 110V OUTLET
GREEN
GREEN
6V
BINDING POSTS (2)
WHITE WIRE
1/4 OHM 50 WATT FIXED RESISTOR

A transformer, rectifier and resistor are the three basic elements of this simplified battery charger.

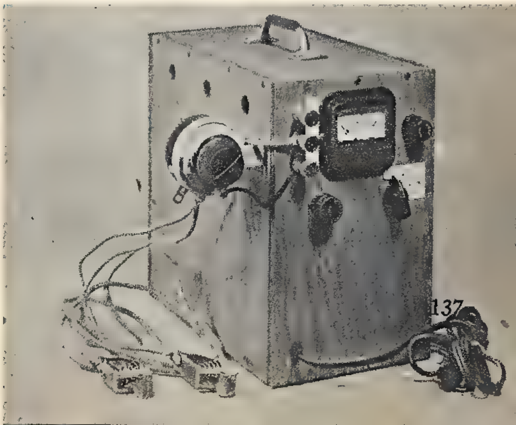

YELLOW TABS
BLACK TABS
SELENIUM RECTIFIER
15 TO 18 VOLT TRANSFORMER
BINDING POSTS (3)
12 V
+
GREEN
GREEN
6V
BATTERY CLIPS TO TERMINALS
BLACK
6V
BLACK
−
FUSE IN HOLDER
BLUE
OFF
LOW
WHITE
MED.
YELLOW
HIGH
TO 110 V OUTLET
RHEOSTAT
DC AMMETER
PILOT LIGHT
TAP SWITCH

The basic unit can be adapted for low-voltage current supply by adding new parts shown above. Minus lead from rheostat is common to 6 and 12 v.

H. CLARK

Inside view. The wiring is very simple and the entire job shouldn't take more than an hour.

Ready to go. The sturdy finished instrument has been designed to give you service for years.



car care
GIs SET FOR NEW TAEJON BATTLE

Photos by Robert Brightman

Spray—for a factory finish

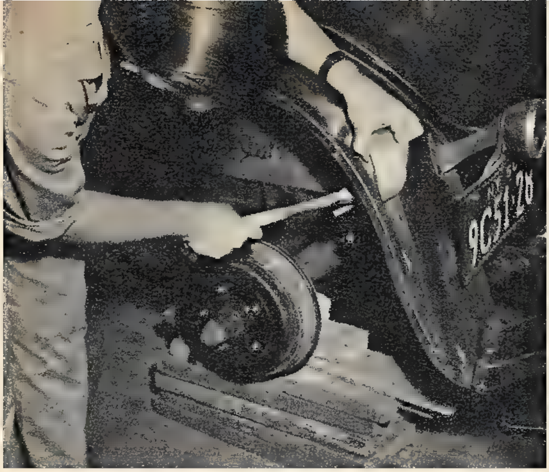
By Frederick C. Russell

RESTORING the old car's showroom complexion may seem like a project to consider after you've finished paying for last year's vacation and the new television set but, take it from MI, you can do the job yourself at surprisingly low cost. The know-how is so easily acquired there's no excuse for driving around in what used to be the family's pride and joy.

Let's assume your case is average and that you are starting with a car already painted and not from bare metal. There will be some bumping out to do on that fender that nudged a stray telegraph pole and this will result in getting down to bare metal in spots. Rusted areas should also be removed. Check first to find out how the metal surface of your car was originally treated at the factory. Should this surface be bonderized, for instance, it is best not to sand as this removes the protective coating. Instead, wash with cleaner's naptha. All this is tedious when you're eager to shoot the spray gun, but remember that the better the preparation of the surface the more the neighbors will be inclined to holler, "Where'd you get the new bus?"

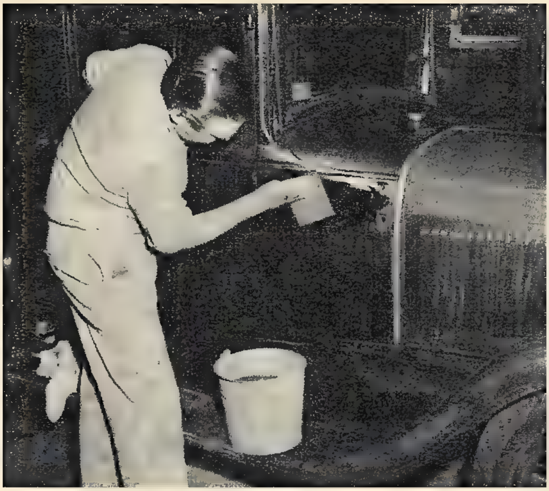
In the trade it is considered good business to refinish in lacquer if the original finish is that type; or in synthetic enamel if this was the assembly line covering. Color coats can be applied directly to the present finish after going over the surface with a good cleaning preparation that will remove all grease, wax and polish, or it can be added after a coat or two of primer surfacer. Right here is where you have the choice of making the job ordinary or de luxe. Considering the time spent on smoothing out the evidences of collision and the interest you are putting into the project there's much to be said for the latter. Incidentally, it is this matter of priming which largely accounts for the big difference in prices quoted by Gasoline Alley for paint jobs.

If the original paint is a color likely to bleed, such as maroon, you can use a coat of aluminum before the finish color. But, regardless of the color scheme be sure to go over the old surface as carefully as possible in order to feather out all spots made by chipping or rusting. A disk sander would be a good investment at this point because you can use the buffer for waxing later. The best job is had by applying a primer surfacer (which has some pigment) and then sanding with wet sandpaper. A good primer is quite



It is best to remove wheels in order to get plenty of working space when beating out dents. Use a pair of axle jacks or heavy blocks to support car.

No primer can substitute for good metal work. A hammer and a pair of dollies can be purchased for as little as $1.29 at many auto chain stores.



The next step is to go over the entire body with No. 320 emery cloth, moistened with water. Do a panel at a time and wipe dry with a cloth.

In order to remove all polish, grease, wax and fingerprints, entire body is wiped down with a cleaning preparation such as Dupont's Prep-Sol.

For best results follow manufacturer's instructions for mixing. In this case one gallon of lacquer is being reduced with three gallons of thinner.

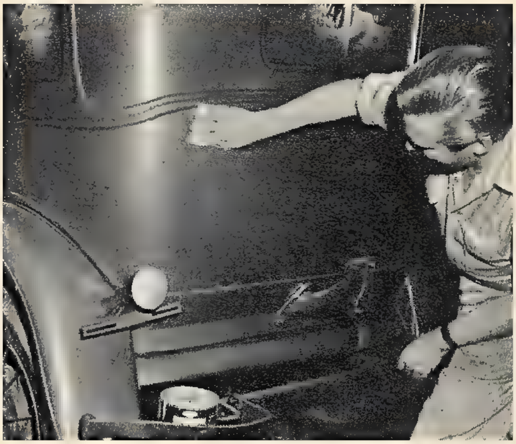
Adjust the air and lacquer mixing valves and test the results on a large piece of cardboard. The machine is a Speedy Sprayer, made by W. R. Brown.

Masking is a tedious but essential job. Use newspapers and masking tape. Fittings, which are not to be sprayed, should be covered or removed.

Spraying requires a knack. Start from the top and work down. If old color bleeds through, a light coat of aluminum lacquer may be necessary.

If you haven't a mechanical polisher, you will have to do your compounding by hand. Go over the entire car if you want that factory finish.

After compounding, waxing is in order. Use a good grade of automobile wax. Apply with a dampened cloth and polish a single panel at a time.



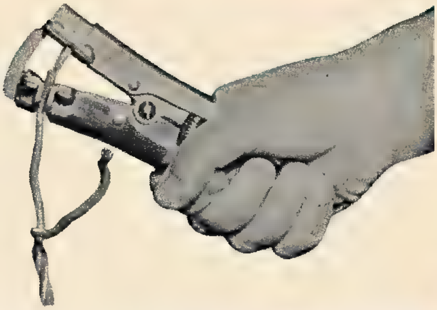
effective for filling and dries quickly.

What the primer does is to prepare a smooth finish for the color coats. If you are doing the de luxe job you'll also want to use a glazing putty for filling in those small imperfections, which may not look like much in the rough state, but which may be cause for apologies later. Preferably select No. 320 sandpaper and use it on the surface after first wetting in water. Naptha wetting may soften the under coat.

The rest of the job is clearly pictured and detailed in the captions, but the project must be smoothed out with some consideration for painting difficulties. Dupont uses five pages in a refinishing book for dealers in order to point up the causes and cures for the odd things that may happen when the spray gun goes into action. For example, there are shrinking and splitting of the primer surfacer which may be due to careless preparation of the surface, too little time for drying between coats, fanning of the air to force drying or applying on a too cold surface. Orange peel is just what the term applies. It is due to improper atomization, too much air or gun too far from the work. Lifting results when lacquer is applied to a car whose previous finish may have been an oil base paint. If such is the case with your car it will be necessary to seal the old paint with aluminum lacquer. Crazing, cracking and checking result from applying top coats before the undercoats are dry.

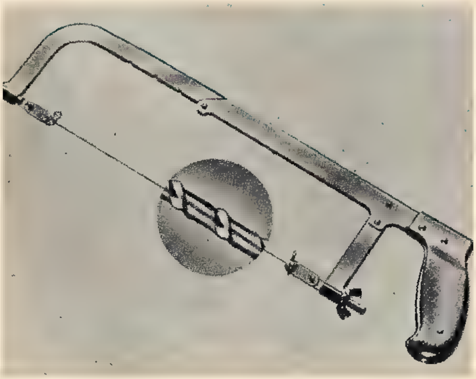
Chalking is a rather natural condition, a result of the gradual breaking up of the film when the surface is exposed to sun and weather. One way to retard this action if the car has to be left outdoors a lot, is to use a mist coat that is mixed with a slower-drying [*Continued on page* 175]

NEW for the SHOP

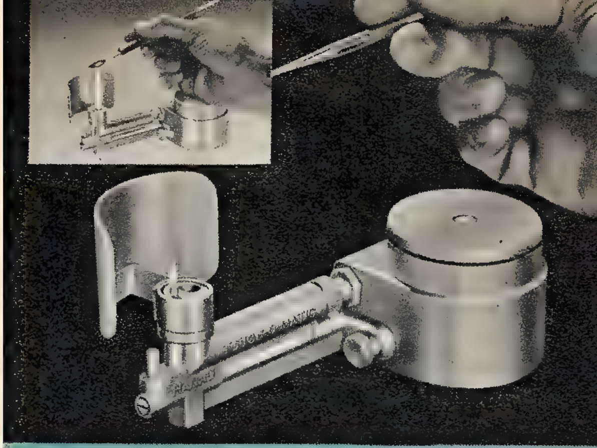


This E-Z tool is designed to strip the insulation from wires used for electrical work in one operation. Can also be used for stranded copper wire. Made by Ideal Industries of Sycamore, Ill. Sells for $5.25.

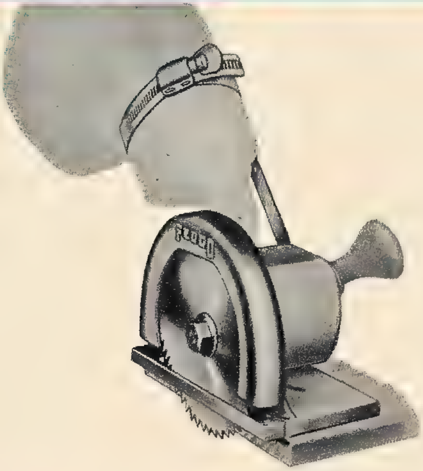
Unusual bolt cutter that operates in a vise has a pair of spring-loaded hardened steel cutters. Sells for $2.95. Will cut bolts and mild steel rods up to ¼ in. in diameter. In-A-Vise Co., Compton, Cal.



Spiral blade hack saw set made for cutting sharp curves in metal is offered by Dock's Tools of Los Angeles. Set of adapters and three hardened blades sell for $1.00; blades are 25 cents each.



An automatic Bunsen burner that flames only when needed has been introduced by Hanau Engineering Co. of Buffalo. Slight pressure of the hand on the platform causes a pilot light to ignite the gas.



New gear-driven saw attachment for ¼-in. drills has an adjustment to control depth of cut. It is designed to be used with one hand. Manufactured by Federal Engineering of N.Y.C. Sells for $9.95.

Pocket screwdriver has four heat-treated retractable blades to fit screws from No. 1 to No. 14. Can be used with blade at offset position. Made by the Shelton Plane and Tool Co. to sell for $1.50.

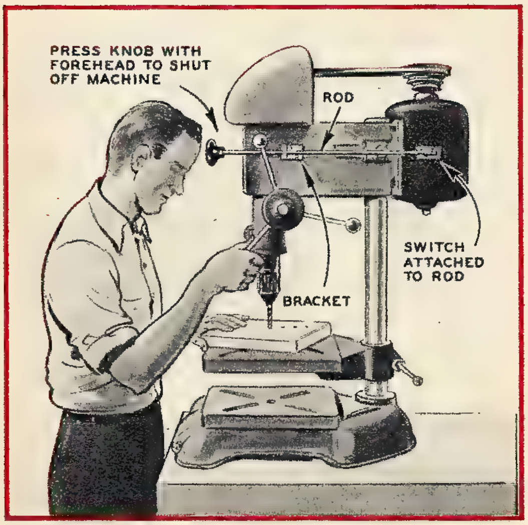
FRANKLIN
GLUE

Liquid hide glue will always be ready for instant service if the can is kept warm on the top of your furnace. Fasten a small brush to the can with a rubber band so that you always have an applicator ready.

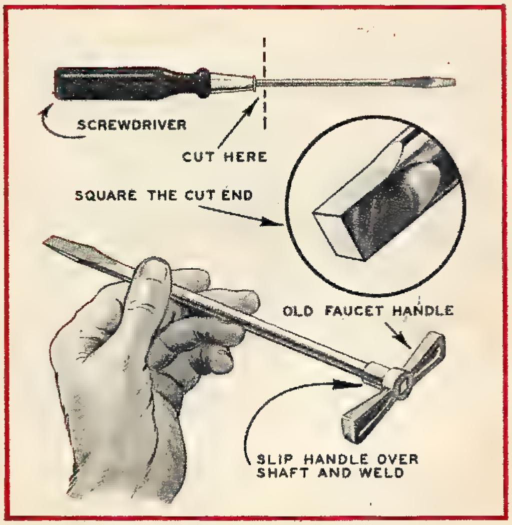
Chain painting is always a bit of a problem. However, if you reverse ordinary procedure and bring the chain to the paint, the job is a cinch. Wipe off the excess and hang chain on a clothes line to dry.

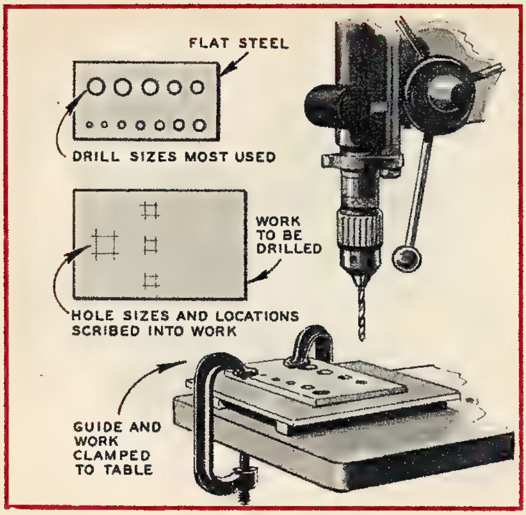
SHOP SHORTS

Drill press accidents occur if your hands are too busy holding work to turn off the switch in time. Such mishaps can be averted by rigging up this emergency switch. Forehead pressure stops machine.

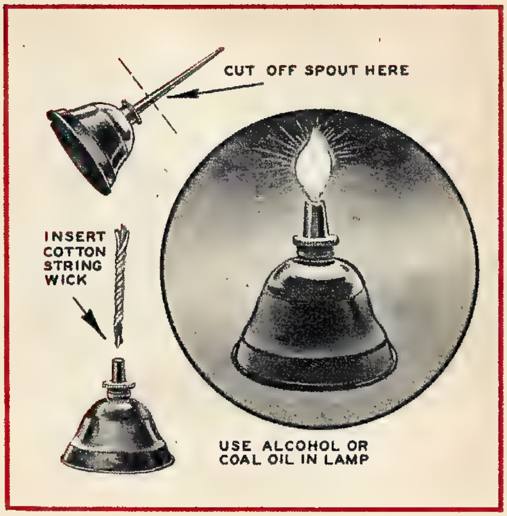

PRESS KNOB WITH FOREHEAD TO SHUT OFF MACHINE
ROD
SWITCH ATTACHED TO ROD
BRACKET

Heavy duty screwdriver can be made from a water faucet handle and a screwdriver whose handle is split or battered beyond use. Cut off blade and square the end so that handle fits snugly. Weld together.


SCREWDRIVER
CUT HERE
SQUARE THE CUT END
OLD FAUCET HANDLE
SLIP HANDLE OVER SHAFT AND WELD

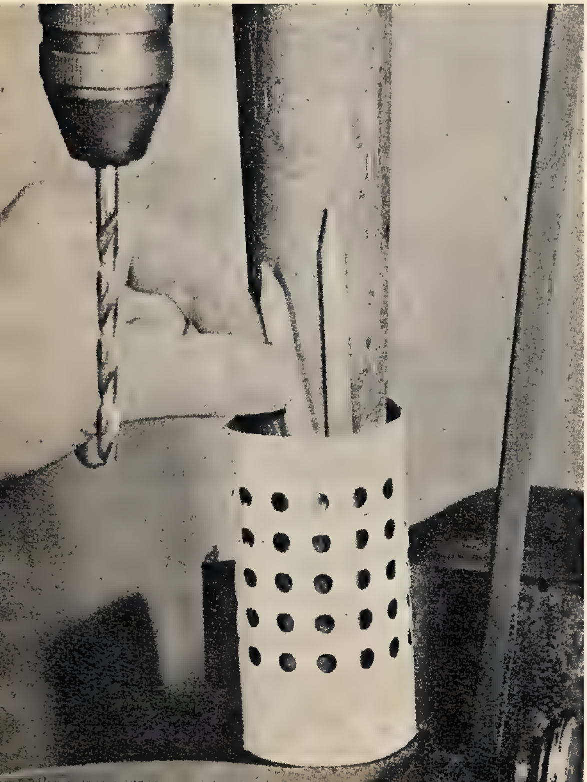

FLAT STEEL
DRILL SIZES MOST USED
WORK TO BE DRILLED
HOLE SIZES AND LOCATIONS SCRIBED INTO WORK
GUIDE AND WORK CLAMPED TO TABLE

Shop-made guide increases accuracy in making holes. Drill series of holes through a piece of steel. "Box in" desired hole size on your work and place respective hole in guide over it. Clamp before drilling.

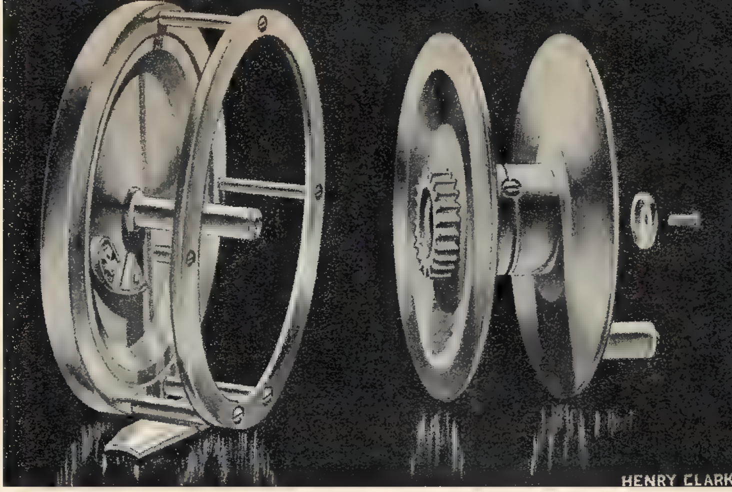

CUT OFF SPOUT HERE
INSERT COTTON STRING WICK
USE ALCOHOL OR COAL OIL IN LAMP

Oil can into lamp. Cut off the spout of a can about one inch above the joint. Fill with alcohol and insert cord as a wick. If you use coal oil, this rig will make an excellent supplementary camping lamp.

Why is it that there never seem to be enough pencils around your shop? Here's one way to keep them on hand. Split the shield from an old radio chassis, then force back in shape around your drill press post.



Cleaning small parts, as well as tiny bolts, screws, etc., is conveniently done by placing items in a common strainer and swishing the sieve around in a pan filled with kerosene or other cleaning solutions.



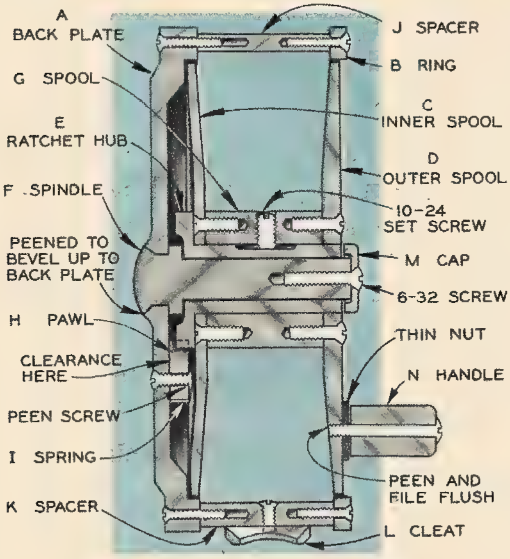
HENRY CLARK

Machine Your Fishing Reel

You will be well prepared for the coming season if you start on this smooth-running job now.

By *Frank E. Shallenberger*

IF you're an enthusiastic fisherman and have a lathe in your workshop, we'll say no more. Here is a duck soup assignment just for you! You may want to refine this reel here and there, but it's a top-notch instrument as it is, and is simply made. The plate, spools and ring were cut from easily worked ⅛ in. flat surplus aluminum. The back plate was assembled from ⅛ in. sheets, bolted while machining. But you may prefer ⅜-in. stock which would eliminate the extra holes around the face.

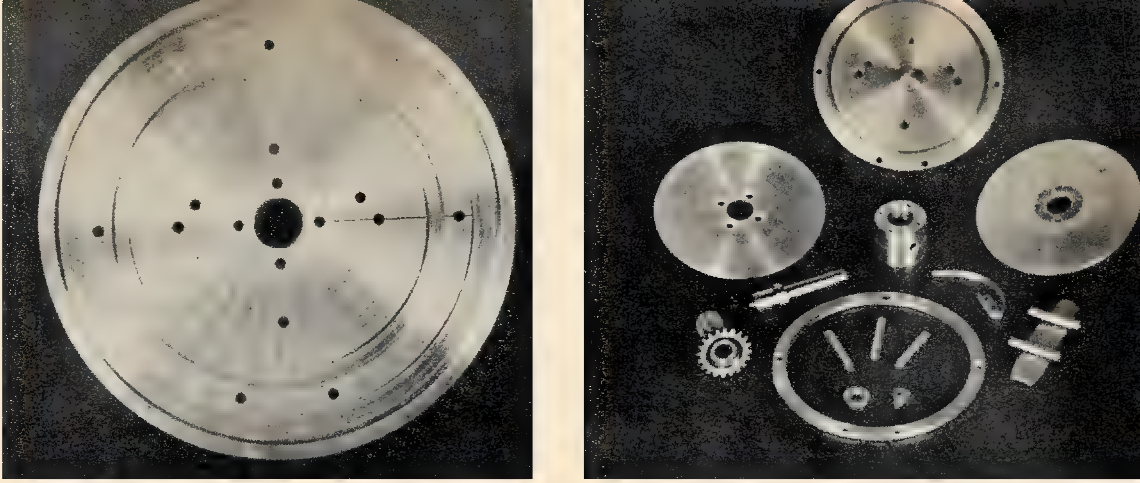

A BACK PLATE
G SPOOL
E RATCHET HUB
F SPINDLE
PEENED TO BEVEL UP TO BACK PLATE
H PAWL
CLEARANCE HERE
PEEN SCREW
I SPRING
K SPACER
J SPACER
B RING
C INNER SPOOL
D OUTER SPOOL
10-24 SET SCREW
M CAP
6-32 SCREW
THIN NUT
N HANDLE
PEEN AND FILE FLUSH
L CLEAT

SECTION THROUGH REEL ~ (BLUEPRINT DETAILS ASSEMBLED)

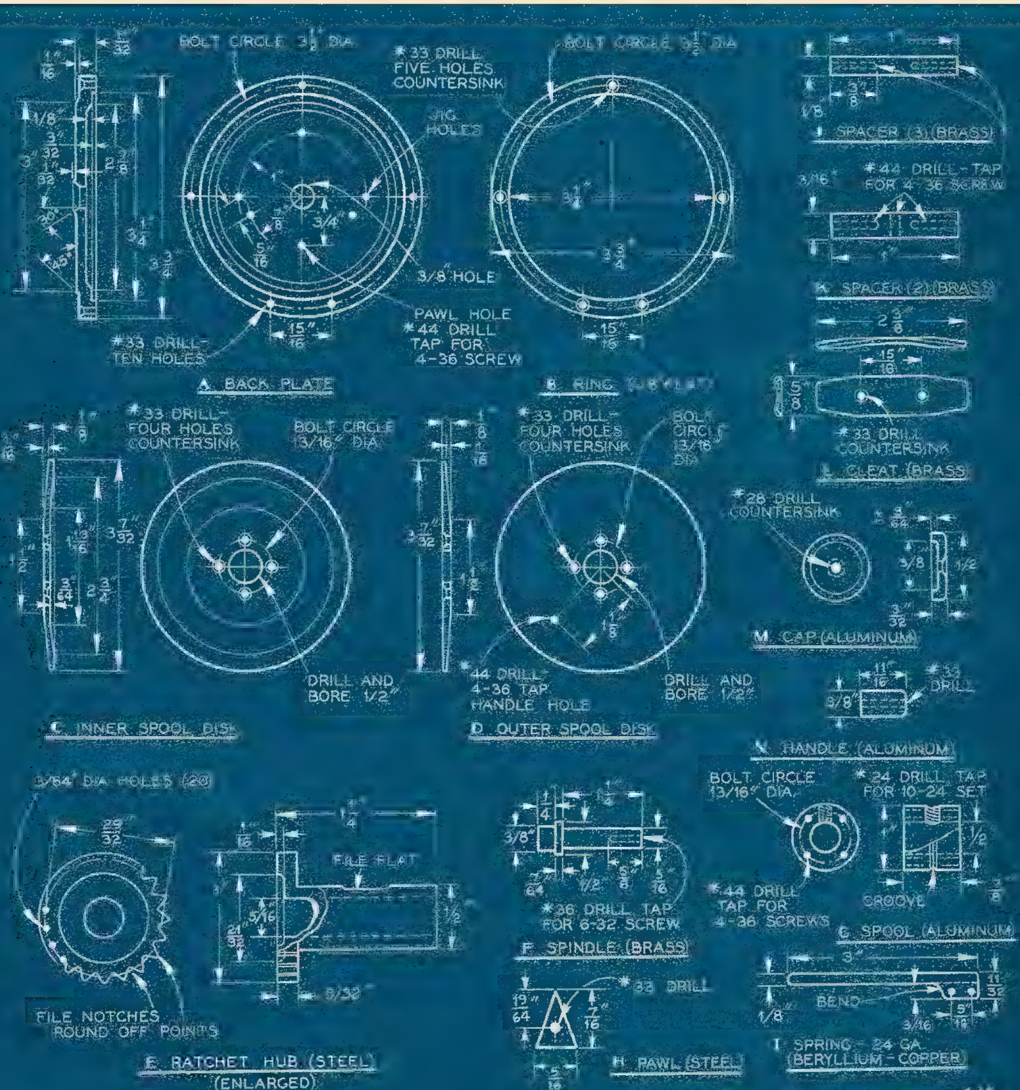
Jig: Because perfect alignment is absolutely imperative, construct a simple combination jig and fixture. This insures accuracy, fit and alignment. Use a steel plate about ¼ in. thick turned to a 5-in. diameter. Face one side. Turn over and clamp in a 3-jaw universal chuck, seating the faced side snugly against the jaw steps and marking the jaw numbers around the rim to enable reclamping later in exactly the same position. Drill a ½-in. hole in the center, scribe circles $\frac{13}{16}$ in., 1½ in., 1¾ in., 2 in., 2¼ in. and 3½ in. in diameter. Using the index head, with tool still set absolutely level with the center, cross-feed by hand scribing two perpendiculars across the plate.

Prick-punch the necessary holes as indicated on parts A, B, C and D. Drill these holes with a No. 33 drill. This completes the layout drill jig, which also acts as the fixture by which the parts are held.

Back plate: [*Continued on page* 160]



Left: The 5-in. diameter jig fixture to which all the disks are screwed while machining. Right: Parts ready for assembly.


BOLT CIRCLE 3½" DIA.
#33 DRILL FIVE HOLES COUNTERSINK
JIG HOLES
3/8" HOLE
PAWL HOLE #44 DRILL TAP FOR 4-36 SCREW
#33 DRILL- TEN HOLES
A BACK PLATE
BOLT CIRCLE 3½" DIA
B RING
J SPACER (3) (BRASS)
#44 DRILL - TAP FOR 4-36 SCREW
K SPACER (2) (BRASS)
#33 DRILL COUNTERSINK
L CLEAT (BRASS)
#33 DRILL- FOUR HOLES COUNTERSINK
BOLT CIRCLE 13/16" DIA
DRILL AND BORE 1/2"
C INNER SPOOL DISK
#33 DRILL- FOUR HOLES COUNTERSINK
BOLT CIRCLE 13/16 DIA
#44 DRILL- 4-36 TAP HANDLE HOLE
DRILL AND BORE 1/2"
D OUTER SPOOL DISK
#28 DRILL COUNTERSINK
M CAP (ALUMINUM)
#33 DRILL
N HANDLE (ALUMINUM)
3/64" DIA. HOLES (20)
FILE FLAT
FILE NOTCHES ROUND OFF POINTS
E RATCHET HUB (STEEL) (ENLARGED)
#36 DRILL TAP FOR 6-32 SCREW
F SPINDLE (BRASS)
#33 DRILL
H PAWL (STEEL)
BOLT CIRCLE 13/16" DIA.
#44 DRILL TAP FOR 4-36 SCREWS
#24 DRILL TAP FOR 10-24 SET
GROOVE
G SPOOL (ALUMINUM)
BEND
I SPRING - 24 GA. (BERYLLIUM - COPPER)

Monthly Photo Contest

Please put your name, address and picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope or postage for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Please address your entries to: Photo Contest, *Mechanix Illustrated*, 67 W. 44th Street, New York 18, N. Y.

1st Prize ($10.00) ....Lazy Panda
A giant panda at St. Louis Zoo obligingly posed for Helen Brush of Los Angeles, Cal.

$5.00 Award ....Summer Thirst
Arthur Schoeni of Falls Church, Va., used a Graphic with Super XX at 1/100 and f-5.6.

$5.00 Award ....Meditation
An interesting design by Ernst Ebbefeld of Jackson Heights, N. Y. Shot with Argoflex.

$5.00 Award ....Just Fishin'
A familiar summer scene by Wellington Lee of The Bronx, N. Y., on Super Pan Press film.

The completed flash unit works well with the No. 5 bulb. It is possible to hand hold the gun but it works easier with a clamp.

synchronize your box camera

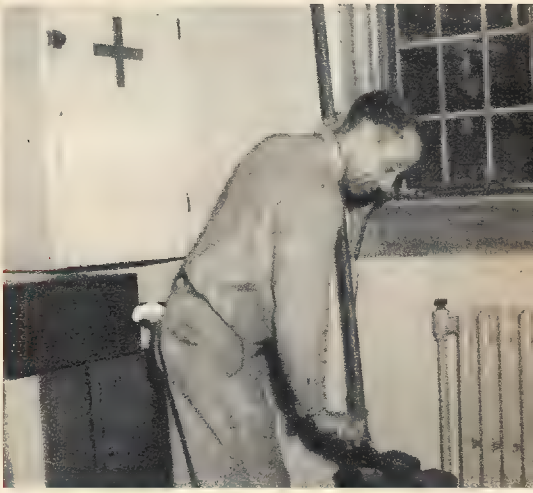
By Wm. Dukeshire,

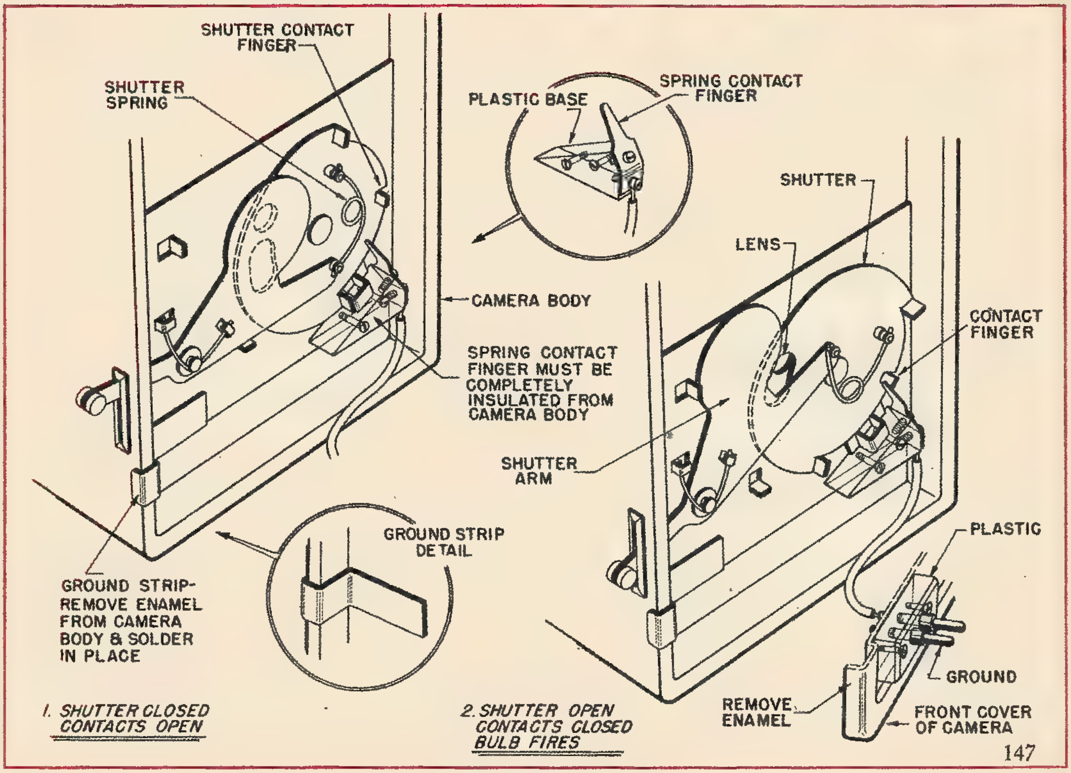
Progressive School of Photography

THE trick of transforming a plain box camera to one that can take flash pictures requires a few simple hand tools and a few cents worth of materials.

What is done, simply, is to set up an electric circuit. The circuit is open until the camera shutter is tripped, and then as [*Continued on page* 182]

A sample of what can be taken indoors with this unit, using no other lights. It also works outdoors as a fill in light.




SHUTTER CONTACT FINGER
SHUTTER SPRING
PLASTIC BASE
SPRING CONTACT FINGER
SHUTTER
LENS
CAMERA BODY
CONTACT FINGER
SPRING CONTACT FINGER MUST BE COMPLETELY INSULATED FROM CAMERA BODY
SHUTTER ARM
GROUND STRIP DETAIL
PLASTIC
GROUND STRIP-REMOVE ENAMEL FROM CAMERA BODY & SOLDER IN PLACE
GROUND
REMOVE ENAMEL
FRONT COVER OF CAMERA
1. SHUTTER CLOSED CONTACTS OPEN
2. SHUTTER OPEN CONTACTS CLOSED BULB FIRES

Shoot 'em In the Dark

The key to taking really candid flash photographs with no visible light.

By James W. Kyle, Jr.

CANDID fans, here's a way to take pictures with no visible light. The secret of the process is to use infrared light. However infrared film is not enough, infrared flashbulbs or an infrared filter in front of your usual flashbulb is necessary.

The filter works quite well if your reflector is the type that will not leak light around the edges and back. It is the least expensive method.

All you need for constructing the filter is a No. 87 Wratten filter, cardboard and glue. Trace the diameter of your reflector on the cardboard and make another line ¼ in. outside that. Cut two rings this size and sandwich the filter between them. You can use a rubber band to hold the filter firmly onto the reflector. Tape it firmly on to both edges of the filter. Also use black photo tape to seal out any light leaks around the edges.

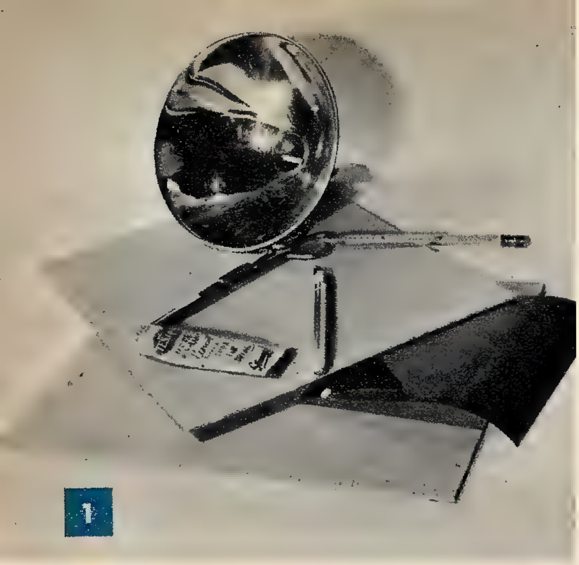
Infrared bulbs are manufactured, but they are expensive and are sometimes hard to find. Dye dipping your own bulbs is the best way around that problem. This is the original British formula with American dyes substituted:

Eosin Yellow Certified	**4 grams**
Tartrazine	**6 grams**
Wool Violet 4BN	**4 grams**
Wool Green S	**10 grams**
Hard gelatin	**200 grams**
Glycerine	**100 c.c.**
Water to make	**1 liter**

Dissolve each dye separately, adding a little gelatin solution to each. Dissolve the rest of the gelatin separately, and add the dyes to it in order. Let this stand overnight, and if necessary, filter it through muslin. Heat the solution to 95° F and dip each bulb twice. The bulbs should be allowed 24 hours to dry.

The dyes may be ordered from the Central Scientific Company, Chicago or National Aniline Chemical and Dye Corp., New York. They should be ordered as biological stains, in ten gram lots.

It's hard to give definite exposure guides without blackout flash, since individual equipment varies so. With midget bulbs and infrared film, the guide number is 55 at 1/50 of a second. Faster shutter speeds are not recommended. If you use other sizes, you can find the guide number for the blackout flash on the regular published tables. Simply look up the guide number for the bulb and shutter speed you plan to use, for a film rating of 64 Weston. Divide that guide number by 6. The result will be the approximate guide number for the blackout flash with that size bulb. A more accurate method is to run a series of tests. Set up a scene typical of those you intend to shoot, make a series of exposures ranging from two stops on either side of your approximate guide number. Process and print them and the negative giving the best print should be taken as standard, and the aperture used to make it multiplied by the distance in feet from the bulb to the subject in the test. The product will be your own personal blackout flash guide number.


1

2

The manufacturer's recommendations should always be closely followed when processing your infrared blackout flash photographs. In general, the developing times should run about 35 per cent under normal than for other films. Ten minutes in Microdol at 68°F, instead of the usual 16 minutes. However, if at all necessary, the films can always go to the full normal developing time without worry of them going too contrasty, and over-development does add a bit of speed to the film. In fixing and washing the infrared films, they are handled in the same way that you would take care of your ordinary films. The infrared 35mm emulsions tend to be on the grainy side, but with care satisfactory enlargements are possible.

One word of warning, infrared light and heat rays are close relatives. Heat will fog your infrared film as fast as raw light. •

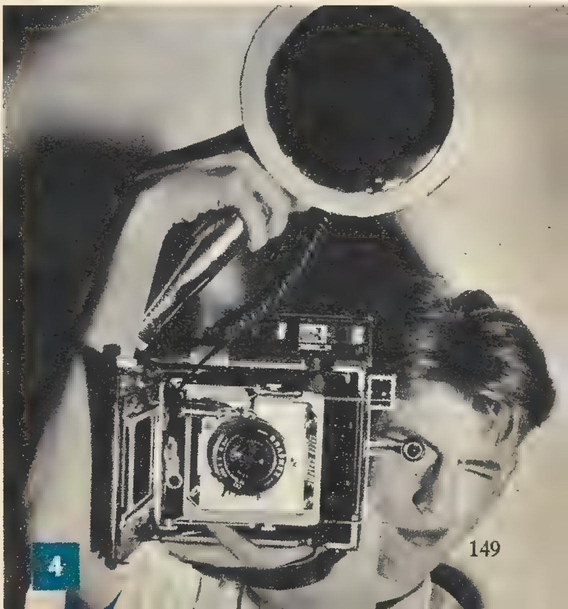
3

Your only expense in making an infrared filter, is the Wratten No. 87 gelatin filter. The cardboard, glue and sharp knife, should be in your supplies.

Draw two circles on your cardboard, one about ¼ in. larger than your reflector. Cut them carefully and sandwich the filter between them.

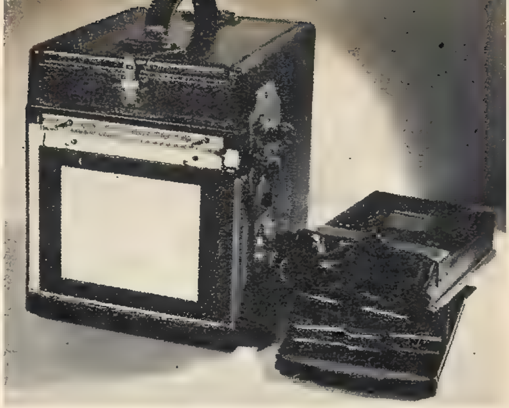
The Saturday movie matinee should produce wonderful subjects and with your infrared flash they probably won't know that you're around.

You can mount the filter on your reflector by taping a rubber band across the back. Use black photo tape on the edges if they leak any light.


4

THE adapter shown in the illustration enables 3¼x4¼ film to be used on a 4x5 Graflex camera. Although the adapter virtually becomes a part of the camera, it can be quickly removed when 4x5 holders are to be used. The same construction can be used in making an adapter for any other camera with a similar back.

Ordinary tin can material, solder, black velvet and glue are the chief materials required. The main frame of the model was cut from the side of a large juice can. The opening is easily made with tin snips after a starting hole is cut. In bending the edges, be careful to make the outside of the frame so it fits snugly in [*Continued on page* 175]



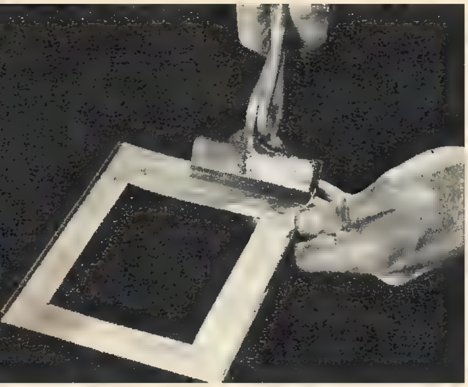
The completed adapter holding a 3¼x4¼ cut film holder on a 4x5 Graflex. Film pack or magazine can also be employed.

GRAFLEX reducer-adapter

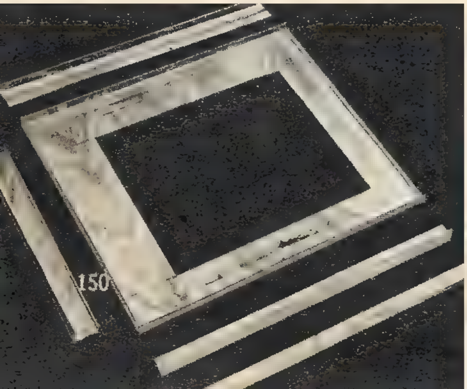
An interchangeable reducing back to cut your film costs.

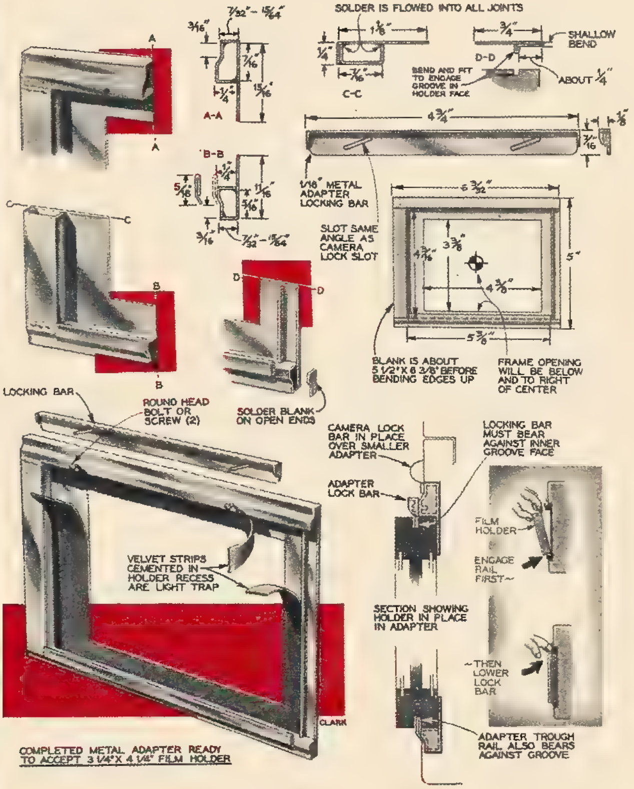
By Walter E. Burton

Bending edges of main frame blank. Wide nosed pliers are handy but not essential. Bends are made using a vise and a hammer.



Exploded view showing main parts of the adapter before soldering operations. The shaded metal strips are upside down.




SOLDER IS FLOWED INTO ALL JOINTS
A
A-A
7/32"–15/64"
3/16"
7/16"
15/16"
1/4"
B-B
5/16"
1/4"
11/16"
5/16"
3/16"
7/32"–15/64"
C
C-C
1 1/8"
1/4"
7/16"
D
D-D
3/4"
SHALLOW BEND
BEND AND FIT TO ENGAGE GROOVE IN HOLDER FACE
ABOUT 1/4"
4 3/4"
1/8"
7/16"
1/16" METAL ADAPTER LOCKING BAR
SLOT SAME ANGLE AS CAMERA LOCK SLOT
6 3/32"
3 3/8"
4 3/16"
4 3/8"
5"
5 3/8"
BLANK IS ABOUT 5 1/2" X 6 3/8" BEFORE BENDING EDGES UP
FRAME OPENING WILL BE BELOW AND TO RIGHT OF CENTER
B
LOCKING BAR
ROUND HEAD BOLT OR SCREW (2)
SOLDER BLANK ON OPEN ENDS
CAMERA LOCK BAR IN PLACE OVER SMALLER ADAPTER
LOCKING BAR MUST BEAR AGAINST INNER GROOVE FACE
ADAPTER LOCK BAR
FILM HOLDER
ENGAGE RAIL FIRST
VELVET STRIPS CEMENTED IN HOLDER RECESS ARE LIGHT TRAP
SECTION SHOWING HOLDER IN PLACE IN ADAPTER
THEN LOWER LOCK BAR
ADAPTER TROUGH RAIL ALSO BEARS AGAINST GROOVE
CLARK
COMPLETED METAL ADAPTER READY TO ACCEPT 3 1/4" X 4 1/4" FILM HOLDER

paper safe

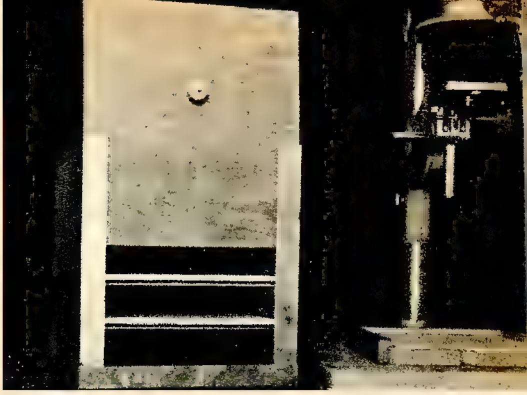
No more fumbling in your darkroom for photo paper.

By Bill Dean

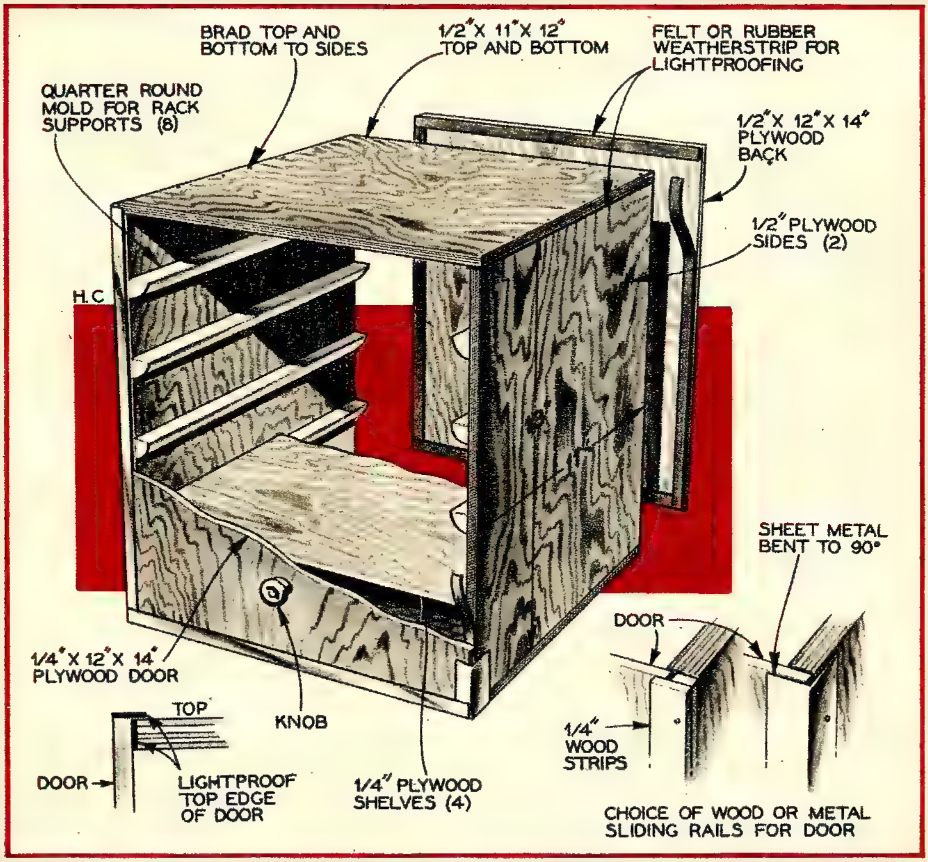
YOU will need five square feet of ¼ in. plywood, enough plywood to make the number of shelves you want, a 1½ in. strip of light steel or monel metal 40 in. long, and some heavy felt or cheap weatherstripping.

Outside dimen-

[Continued on page 192]

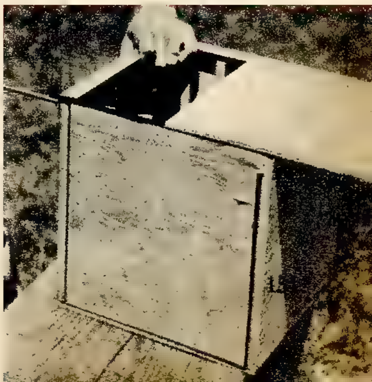


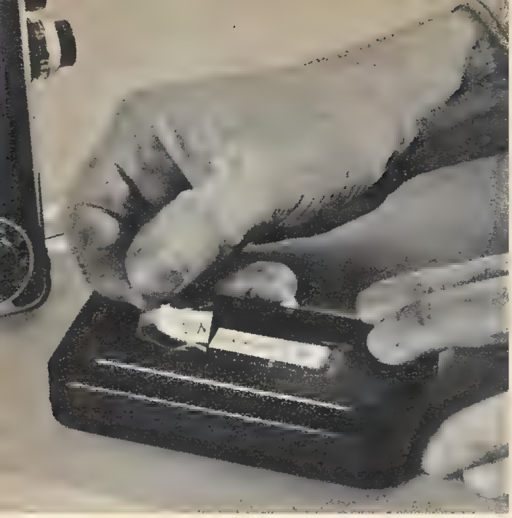
The completed paper safe being used in a darkroom. Handy as both a time and space saver.


BRAD TOP AND BOTTOM TO SIDES
1/2"X 11"X 12" TOP AND BOTTOM
FELT OR RUBBER WEATHERSTRIP FOR LIGHTPROOFING
QUARTER ROUND MOLD FOR RACK SUPPORTS (8)
1/2"X 12"X 14" PLYWOOD BACK
1/2" PLYWOOD SIDES (2)
H.C
SHEET METAL BENT TO 90°
DOOR
1/4"X 12"X 14" PLYWOOD DOOR
TOP
KNOB
1/4" WOOD STRIPS
DOOR
LIGHTPROOF TOP EDGE OF DOOR
1/4" PLYWOOD SHELVES (4)
CHOICE OF WOOD OR METAL SLIDING RAILS FOR DOOR

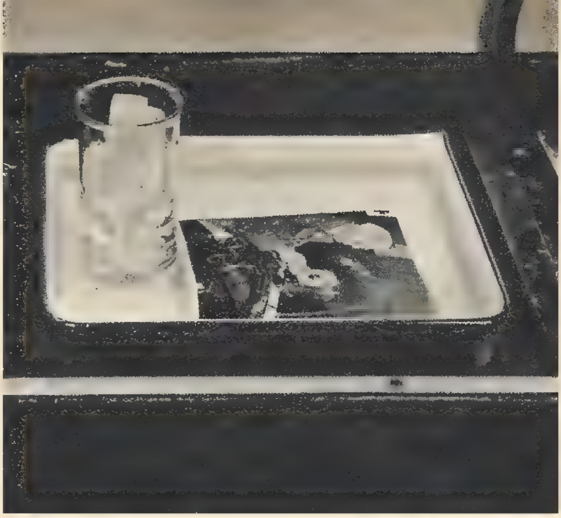
Left: Felt or weatherstripping, in the joints and around the surfaces of the sliding door, will completely seal the safe.

Right: Sheet metal in strips, bent to 90° provides a good light trap and sturdy guides for the door to slide up and down on very easily.





Marking film containers. Print UNEXPOSED on a strip of paper covered with transparent tape. Cut the tape in two, and after the film is exposed peel off the UN to show that the film has been used.



Solution Cooler. To cool a tray of developer or hypo in hot weather without diluting your solutions, fill a water glass with ice cubes and stand it in a corner of your tray or film developing tank.

photo tips

Solution Warmer. To bring up the temperature of your solutions, mount infrared heat lamps below shelf with holes cut in it. Place your trays over the holes and your heating problem is easily solved.

Mark your slides. By stenciling a large letter X on one side of your film slides it's easy to see which side is exposed. Bright colored airplane dope or quick drying lacquer works very well.

NEW for the PHOTOGRAPHER

MOVIE TITLES
like this one
ARE MADE WITH THE
MAGIC MASTER
LETTER SET

Titling your home movies is made easy with a Magic Master Letter Set. No pins, magnets, or sticky surfaces necessary and letters are washable. Sells for $8.95; Joseph Struhl Co., N.Y.C.

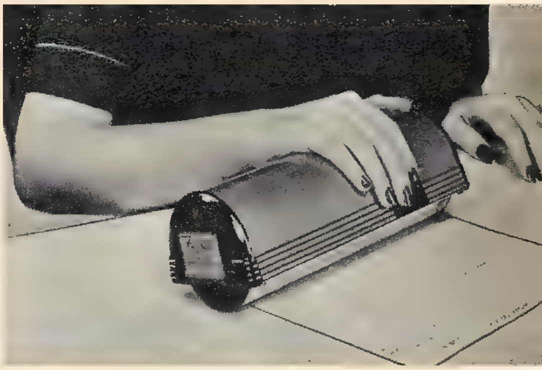
Three pound electronic flash unit using dry cell batteries bringing price per flash to less than a half cent. Guaranteed for 10,000 flashes. This model sells for $29.95. Lumax International, N.Y.C.

Make photo bugs of youngsters with this easy to use, daylight developing kit. Print frame, tray, paper and chemicals are all included to start them off. Pic-Quick sells for $1.49 at all dealers.

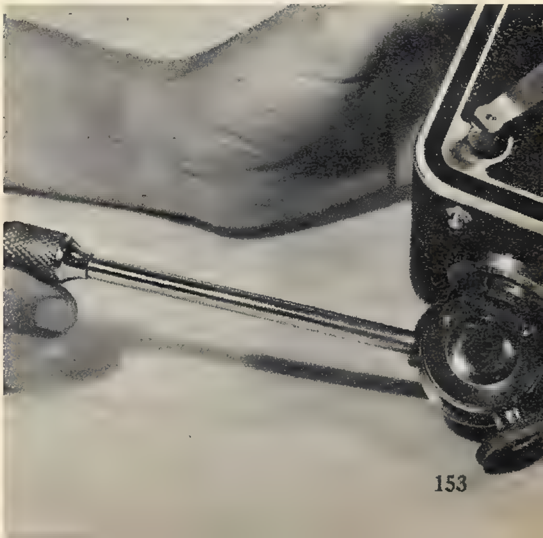
MAGIC! Photo Printing
PIC-Quick
EDUCATIONAL, Easy, FUN!
HOW TO MAKE PHOTOS
with
PIC-Quick

Graflarger Back with Aristo Cold Light, will quickly convert your press camera into an enlarger or transparency viewer. Available at Graflex dealers; $38.75 for all size press cameras.

Ordinary darkroom facilities and an electrical outlet are the only necessities to make photo copies with the Copy-Roll. Priced from $27.50 depending on size. General Prod. Co., Chatham, N. J.



Mini-Panhead locks with one twist of the handle. It fits any tripod and will go in your pocket. Handy for all small cameras up to Rollei size. Price, $2.49; imported by Foremost Camera Stores, N.Y.C.



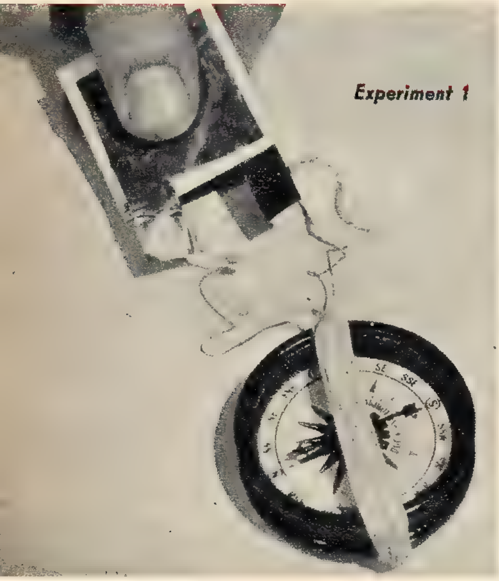
fundamentals of alternating current

You can unmask the mysteries of basic electrical theory by performing these simple experiments.

By Tracy Diers

SCIENTISTS of a century ago knew there were two types of electric current—direct and alternating. It was quite natural that DC received more attention those days only because it could be easily produced by chemical means. As more scientists focused their attention on the radically new alternating current it became more apparent that AC simply would not play the game under the same rules that DC employed. The following experiments point out the contrasting behavior patterns of these two different types of a single force.

Experiment 1. Direct current is easier to produce. Once started, it will flow continuously in one direction. Obtain a sensitive compass and wind 70 or 80 turns of No. 28 double cotton-covered wire around it. You



Above: Galvanometer is formed by coiling wire around a compass and leading wire ends to plates of zinc and copper with vinegar-soaked blotter between them. Below: Resultant current graph.

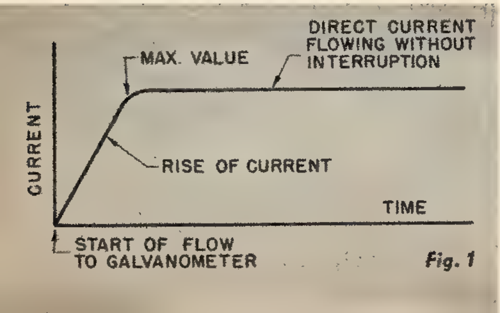
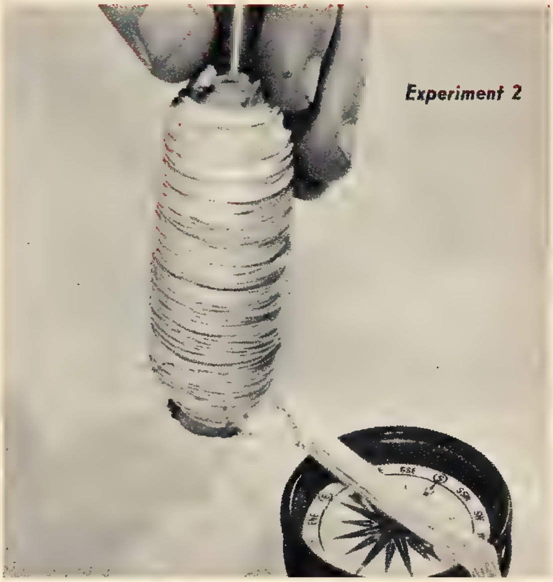


Fig. 1



Above: You can produce alternating current by regularly inserting and withdrawing bar magnet in this elementary solenoid. Below: The sine curve shows how one cycle is actually determined.

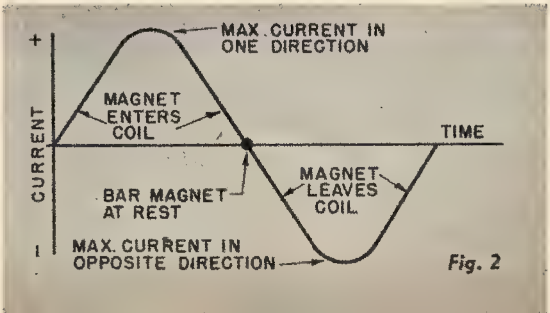


Fig. 2

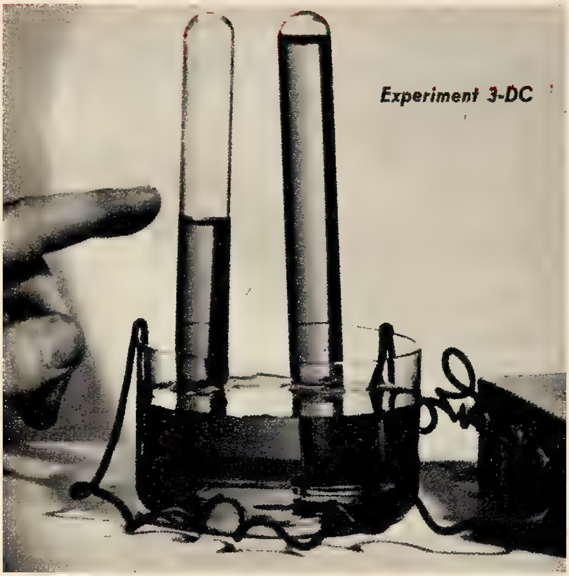
have made a galvanometer, which is an instrument for measuring electric current. Dip a piece of blotting paper in vinegar and squeeze it between a piece of copper and a piece of zinc. Connect the galvanometer wires to this simple cell, one wire to the copper and the other to the zinc.

Compass needle immediately swings over and will stay in that position as long as there is life in the cell. If you reverse the wires, a direct current will flow again, but in the opposite direction—as proved by the compass needle's swing the other way (fig. 1).

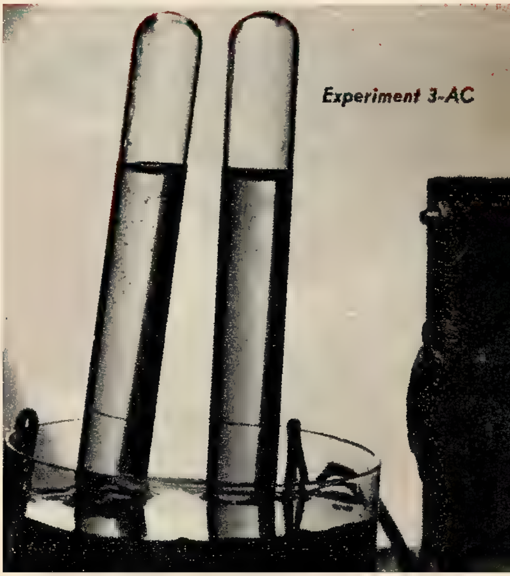
Experiment 2. Let us see how AC differs. You will need a solenoid, which is nothing more than a coil for the production of a magnetic field. This is how it is made: wind about 300 ft. of No. 30 double cotton-covered wire on a form about 3½ in. long and ⅝ in. in diameter. Connect the two wires to the galvanometer wires, and obtain a strong bar magnet. Stand the solenoid upright and quickly plunge the magnet into the solenoid. The compass needle will immediately swing to one side and then return to its former position. If you suddenly withdraw the magnet the needle kicks again, but this time in the opposite direction. Thrust the magnet in and out of the solenoid with a smooth motion and you will be generating a low frequency alternating current.

If your movements have been smooth you will have produced the famous *sine wave* which engineers are always talking about. Fig. 2 shows that the current flowing to the galvanometer is rising and falling, but is also reversing itself. The sine wave shows one cycle and means you have plunged the magnet and taken it out one time. The number of times you do this per second is called *frequency*. If you have AC at home examine your meter box for the frequency marking. It will probably be 60 cycles per second.

When a current rises and falls and still

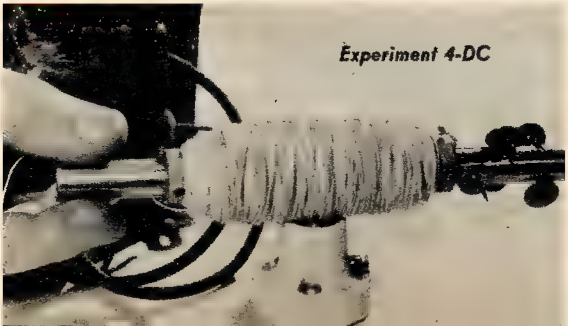


Under this experiment, DC will break water down to its two component parts, hydrogen and oxygen.

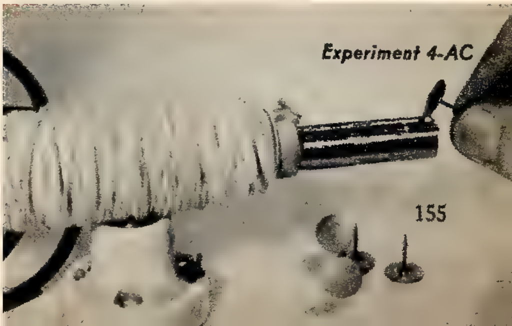


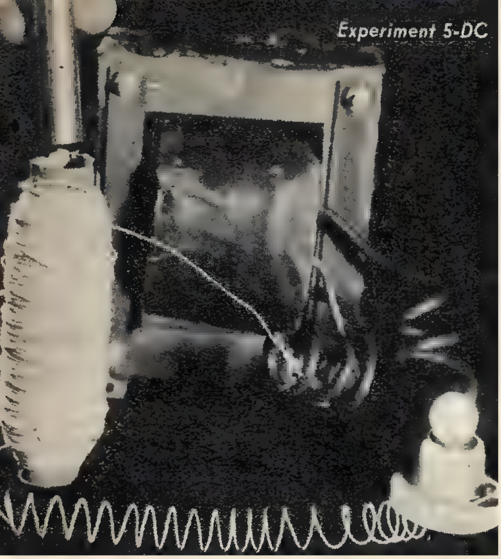
With AC, however, you get an equal mixture of both gases in tubes. See text for explanation.

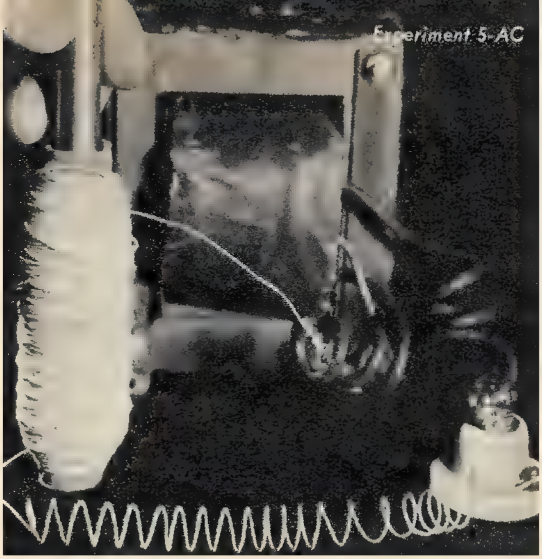
Steel bar placed in solenoid becomes magnetized when direct current is introduced through it.



The magnetism is destroyed after AC has been allowed to run through the bar for a few minutes.







Bulb lights up on DC and the steel bar passed through the solenoid does not affect the situation at all. But when you switch to AC and insert the same bar (above) the light will gradually die out.

reverses itself many times per second we can expect it to produce dramatic effects when compared to DC. Let us see what the electro-chemical effects are.

Experiment 3. Fill a large dish and two test tubes with water to which you have carefully added a few drops of concentrated sulphuric acid. (This makes the water a better conductor.) Use two rubber-covered wires with a ½ in. skinned from the end of each. Slip one wire under each test tube and hook one wire to the positive terminal of a 45-volt B battery and the other wire to the negative terminal. Gases will arise in both tubes and in a few minutes you will find that one of the tubes has twice as much gas as the other. The tube having the larger amount of gas contains hydrogen and the other tube has oxygen. You have decomposed the water!

Try it now with AC from a toy train transformer of about 12 to 24 volts. Now you will see that the gases are formed equally and the liquid levels are the same after a few minutes. You now have a mixture of both gases in each tube. With direct current hydrogen will always form at the negative terminal. When you use AC one terminal will release hydrogen while it is negative (first half of sine wave), then it becomes positive and produces oxygen (second half of sine wave).

For this reason AC cannot be used to charge storage batteries. Whatever chemical effect is produced in the first half of the sine wave is destroyed in the second portion when the current reversal sets in.

Experiment 4. The rise, fall and reversal of alternating current produces some interesting magnetic effects. Direct current will make a magnet, but alternating current will destroy it just as quickly. Connect seven or eight large size dry cells in series and connect the solenoid used in Experiment 2 to these cells. Now place a piece of hard steel in the center of the solenoid and leave it there for a few minutes. At the end of this time remove the steel and you will find that you now have a fairly strong magnet.

Let us see what [*Continued on page* 177]

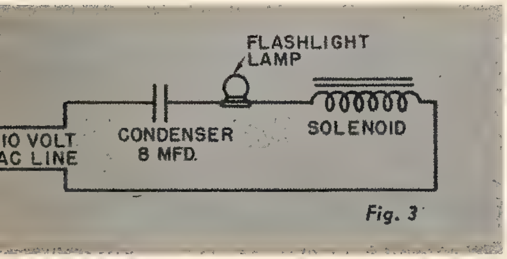


Fig. 3

Under this set-up the bulb burns very dimly when the core is removed from solenoid (Exp. 6).

Experimental transformer is made by winding 20 ft. of wire around your solenoid. See Exp. 7.

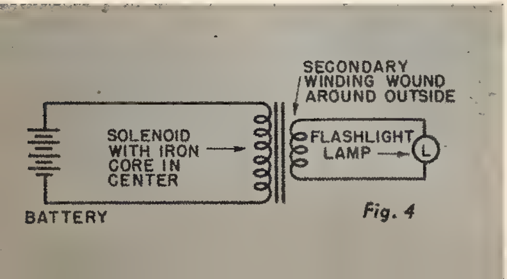
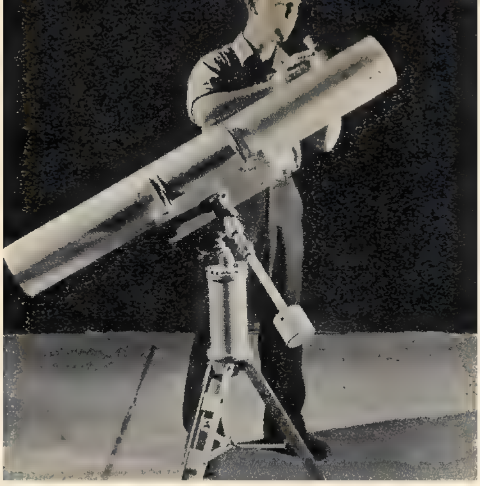

SECONDARY WINDING WOUND AROUND OUTSIDE
SOLENOID WITH IRON CORE IN CENTER
FLASHLIGHT LAMP
L
BATTERY

Fig. 4

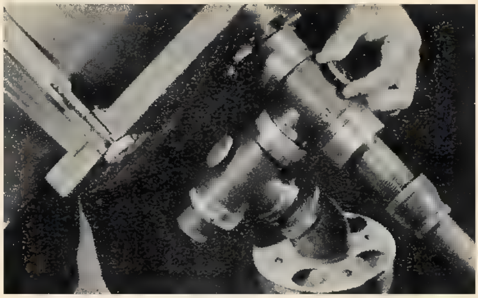
The Amateur Telescope Maker's Page

Conducted by Robert Brightman



Fred Pokorny of Franklin Square, L. I., and his first telescope, a six-inch Newtonian made of an aluminum tube and brass pipe fittings.

Close-up of the eyepiece construction. The ocular he is using is one designed for richest-field observation. The adapter was turned on a lathe.



Note the use of standard pipe fittings. The instrument is a fixed-latitude model designed for use in the New York City area, 42° north latitude.

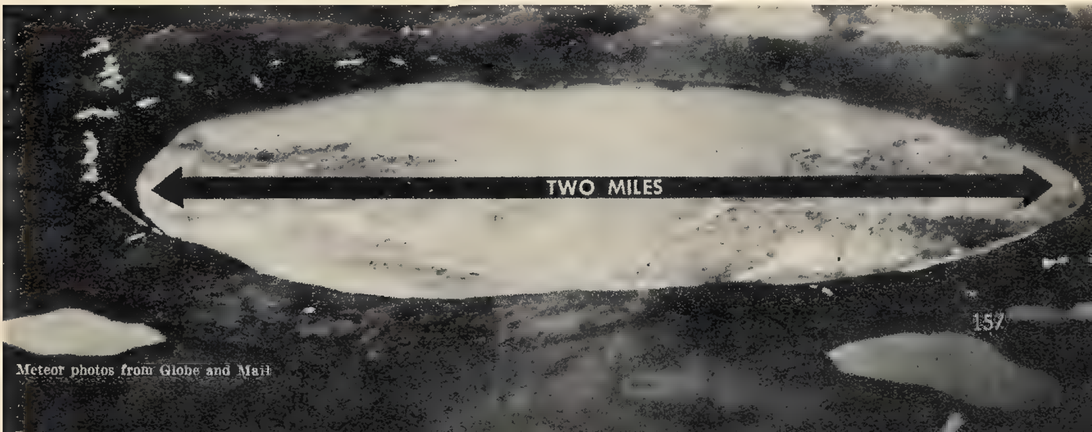
IN the far nothern barren lands of Quebec's Ungava area, the world's biggest meteoritic crater has been discovered by a scientific expedition from Toronto. Dr. V. Ben Meen, director of the Royal Ontario Museum of Geology and Mineralogy, made the discovery. He says it is the eighth scientific wonder of the world.

With a destructive force that would make any atom bomb so far developed seem puny, a mass of material streaked through space some 3,000 to 5,000 years ago, roared into earths atmosphere and became heated to incandescent temperature. Distorted from its path by gravity, it smashed into Ungava's solid granite with an explosive power sufficient to wipe out of existence any city on this continent today.

Belief that the squat, ugly crater on the treeless tundra found birth in the crash of a meteorite was emphatically expressed by Dr. Meen, who headed the expedition. The crater, he said, could have been created in only two ways—by a meteorite or a volcano. There is plenty of negative evidence that it was not a volcano. Dr. Meen believes that

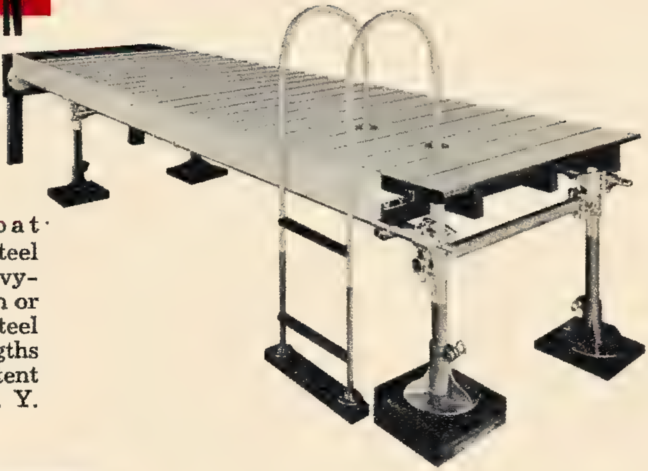
[*Continued on page* 192]

Ungava Crater, the world's largest meteor crater was recently discovered in Quebec. It measures two and a half miles from crest to crest and contains a lake two miles wide.



Meteor photos from Globe and Mail

NEW for the BOATMAN



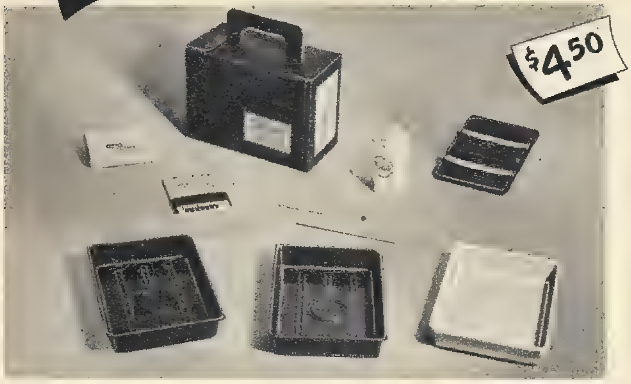
Prefab Pier for small-boat owners consists of a wooden deck on steel framework. Easily erected, this heavy-duty structure can be made any length or width. The bearers, of galvanized-steel tubing, are available in several lengths to suit varying depths of water. Patent Scaffolding Co., Long Island City, N. Y.

Boat Kit. This 8-ft. pram is assembled from precision-cut parts. No building jig is needed. Even a youngster can follow the step-by-step illustrated directions. Weighing 68 lbs. when done, the pram can be rowed, sailed, or powered with an outboard motor. $36. U-Mak-It Products, 701 Whittier St., New York 59.

Yachts for Tots. The square-rigged Buccaneer, below, and the fore-and-aft-rigged Hornet, right, are 5½-ft. nonsinkable sailboats for youngsters. A tether line is included with each boat so a grownup can keep the young skipper in safe waters. Price: about $110. Sea Skates, P. O. Box 84, Manhasset, N. Y.

YOU'LL HAVE A WHALE OF A GOOD TIME MAKING YOUR OWN PRINTS

. . . with a new Kodacraft Outfit



Perfect for the beginner—Kodacraft Printing Kit . . . easy-to-follow directions for making your own prints. Packed in suitcase-type carton.

3 5x7 Tenite Trays in black, gray, and red. Nubs on bottom provide rocker action for agitation.
1 Kodak Printing Frame
1 Kodak Mask Chart for Kodak Printing Frame
1 25-sheet package of 2½ x 3½ Kodak Velite Paper for printing under daylight conditions
1 Kodak Tri-Chem Pack
1 Graduate
1 Kodak Darkroom Thermometer
1 Kodak Glass Stirring Rod
1 Complete Instruction Book

Everything you need to develop and print—Kodacraft Photo-Lab Outfit . . . includes new Kodacraft Roll-Film Tank. Suitcase-type carton for handy storage.

1 Kodacraft Roll-Film Tank with 620-120 roll-film apron
3 Rocker-type 5 x 7 Tenite Trays
1 Kodacraft Printing Frame, 4½ x 5½
1 Kodacraft Print Mask Set
1 25-sheet package of 2½ x 3½ Kodak Velite Paper
2 Kodak Tri-Chem Packs
1 8-oz. Plastic Graduate
1 Kodak Darkroom Thermometer
2 Kodak Junior Film Clips
1 Complete Instruction Book

A complete outfit, including metal printer and roll-film tank—Kodacraft Advanced Photo-Lab.

1 Improved Kodacraft Metal Printer . . . 2 Center-opening Kodak Ruby Printing Masks for 2¼ x 3¼ and 2¼ x 2¼ negatives . . . 1 Kodak Mask Chart . . . 1 Kodacraft Roll-Film Tank with 620-120 roll-film apron . . . 3 Rocker-type 5 x 7 Tenite Trays . . . 1 25-sheet package of 2½ x 3½ Kodak Velite Paper . . . 2 Kodak Tri-Chem Packs . . . 1 Kodak Darkroom Thermometer . . . 1 Graduate . . . 2 Kodak Junior Film Clips . . . 1 Kodak Glass Stirring Rod . . . 1 Brownie Darkroom Lamp, Model B . . . 1 Complete Instruction Book

Prices are subject to change without notice and include Federal Tax

YOUR KODAK DEALER WILL BE GLAD TO SHOW YOU THESE KODACRAFT OUTFITS

EASTMAN KODAK COMPANY, ROCHESTER 4, N. Y.

Kodak
TRADE-MARK

Machine Your Fishing Reel

[*Continued from page* 144]

Face one side if necessary. Clamp plate to jig. Using the jig as a guide, drill the holes located ⅞ in. and 1 in. from the center with a No. 33 drill. Spot the necessary holes around the rim and the hole ¾ in. from the center. After unclamping from the jig, drill these with a No. 44 drill and tap carefully for a 4-36 screw.

Using brass screws in these tapped holes, screw the plate to the jig (which now becomes a fixture). Clamp the jig in the chuck, being careful to maintain the previous alignment. Turn the outside diameter, face, cut the recesses, chamfer the corner, then drill and bore the center hole. Reverse the plate on the jig, chamfer the corners and bore the taper in the center hole.

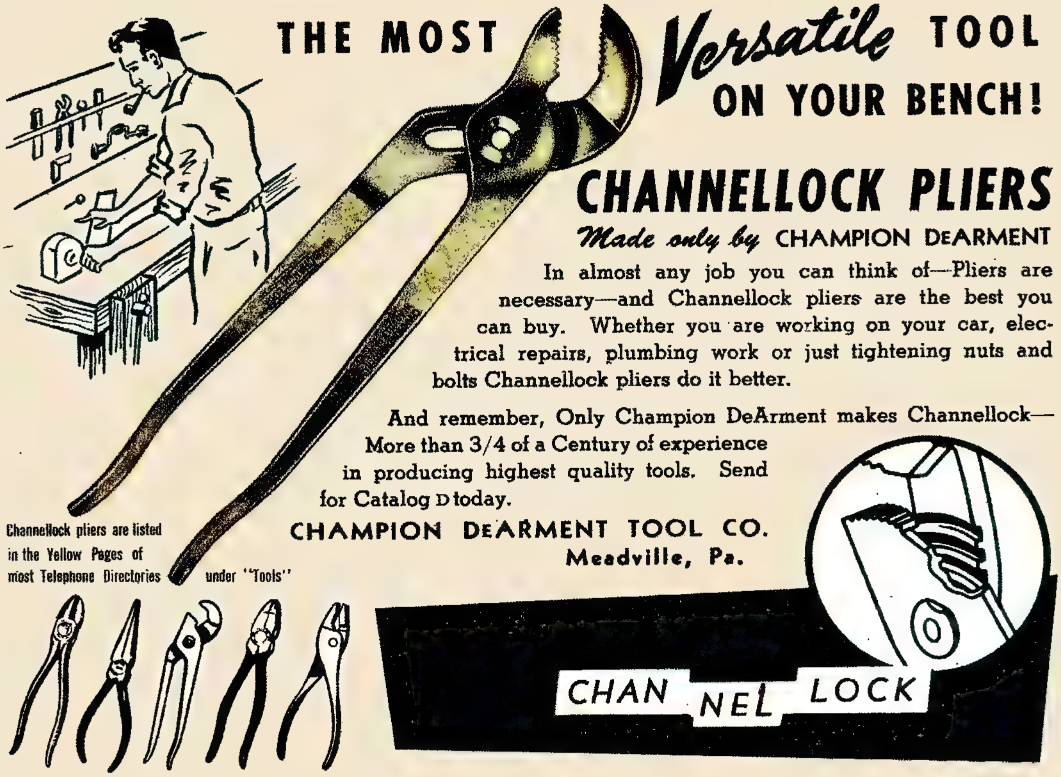
Remove from jig. Drill and countersink as shown. This completes the back plate.

Ring: For ring B, clamp a piece of ⅛ in. or thicker aluminum sheet to the jig, spot the outside holes with a No. 33 drill, drill with a No. 44 and tap. Screw to jig and bore the 3½-in. diameter. Drill out the threads with a No. 33 drill and countersink.

Spool ends: The end disks C and D are next. Drill and tap the inner holes. It is well to drill and tap outer holes in the scrap also for use in the roughing out. This is then cut free when turning the outside diameter as one of the last operations, leaving the spool end clamped to the jig by the inner holes. After turning, complete by drilling out the inner tapped holes with a clearance drill and countersink as indicated. Leave the single crank hole in the outer spool end tapped to receive the handle.

Spool: The spool G is made from 1-in. diameter aluminum rod. Chuck, face and drill the center hole. On the end scribe a $\frac{13}{16}$-in. diameter circle, then cut off. Using the circle as a guide, line up with the jig and drill and tap four holes. Then screw to jig, face the other end, turn both diameters, and scribe a $\frac{13}{16}$-in. circle on the other end. If a 1½-in. mandrel is available, the piece can be turned on it to insure concentricity. In this case drill screw holes last, using the mandrel to line up center hole of spool with that of the jig. Assemble the spool on the mandrel and dress off any eccentricity of the spool ends.

[*Continued on page* 165]



THE MOST *Versatile* TOOL ON YOUR BENCH!

CHANNELLOCK PLIERS

Made only by CHAMPION DEARMENT

In almost any job you can think of—Pliers are necessary—and Channellock pliers are the best you can buy. Whether you are working on your car, electrical repairs, plumbing work or just tightening nuts and bolts Channellock pliers do it better.

And remember, Only Champion DeArment makes Channellock—More than 3/4 of a Century of experience in producing highest quality tools. Send for Catalog D today.

CHAMPION DEARMENT TOOL CO.
Meadville, Pa.

Channellock pliers are listed in the Yellow Pages of most Telephone Directories under "Tools"

CHAN NEL LOCK

MI Tests The '51 Studebakers

[*Continued from page* 89]

efficiency, durability and reliability. But from the consumer's viewpoint they are forced to give ground to the new V-8 type which is smoother and more flexible, especially under a load.

Engineers today have to consider the higher compression ratios already being used and the still higher ones predicted for the future, which raises tough problems in parts-deterioration and cooling. As compression ratios go up, internal heat skyrockets. Piston pressures double and triple, bearings and crankshafts are subjected to extra multiple loads. Under these conditions, the V-8 overhead valve job is far superior to the in-line engine. It's a close-coupled unit with a much shorter and beefier crankshaft. Overhead valves are the only easy answer for valve cooling. When valve stems are located right in the guts of an engine, cooling can take place only during the brief instant when the valves are closed.

In summary, these new V-8 engines are a positive step in the right direction and the start of a trend that, barring war, will sweep the industry within two years. Assuming Uncle Joe Stalin decides to take the chip off his shoulder, Chrysler will be out with a 170-horsepower V-8 job long before the trees start to bud again. Buick will have a new V-8 engine and Pontiac is about to jump on the same gravy train. Ford has had an overhead valve 6-cylinder job in waiting for some time; I drove it two years ago. And Ford also has some V-8 overhead valve plans ready to spring any time the competitive going gets rough.

But now back to Studebaker's new line. Basically, they look about the same as last year except, of course, for the annual grille design change. Right now the new V-8 engines are available only in the Commander and Land Cruiser models. The Champion is unchanged except that you can now get it with one of the optional, automatic you-know-whats, with a direct-drive feature, which Studebaker introduced a little over a year ago. As these rheumatic thingamajigs go, this one seems to me to be less objectionable than most of the others even though, like all the others, it knocks the head off performance the way an August sun takes the head off a schooner of beer. Overdrive is still a buyer's choice at Studebaker and it is, next to a conventional drive, the most worth-while choice of all.

For my tests I selected three cars. First I drove two four-door V-8 Commander sedans, one with automatic transmission and several thousand miles on the clock, the other with overdrive and also thousands of miles of action. As there has been little or no change in the Champion line, I picked a convertible with automatic rheumatism. All tests were made on the three-mile Studebaker track at South Bend and over their proving ground steeplechase.

The first test was of the V-8 Commander with overdrive. The moment I pressed my foot to the floor, the car shot ahead like a race-horse with a hornet on its flank. Long before I reached the first turn I was in the 80's and, since the Studebaker turns are rated at 80, I backed off a bit to get the feel of the rig. After a few warm-up laps I let her out, hitting the turns and going through them at 90, on the clock, and getting up to 100-plus on the short (less than a mile) straightaway.

I think the Studebakers offer the best forward visibility of any car on the road today. From a normal driving position you can see to within inches what's going on under your front wheels, thanks to the tiger shark nose. This gives you a great feeling of security, especially at high speeds.

With which feeling I said to myself, "Now's the time for a speedometer check" and, believe it or not, at 90 this car's clock was right on the button. Next, with a full head of steam, I made double checks over a measured half-mile. When the speedometer just topped 100, actual speed was 98.36. I sincerely believe that on a straight run, with a proper build-up, this new Studie will do an actual 100 mph.

Then came the acceleration tests. Hang on to your berets: zero to 60 through gears *averaged 12.8 seconds!* My fastest single run took 12.5, the slowest 13.2. As you old-time readers know, this is nitroglycerine stuff. Zero to 30 took 4.4 seconds, zero to 50 went 9.5 and zero to 70 mph used up 16.9 seconds. From a standing start I went one-half mile in 31.2 seconds. All I can add is, *Watch this car in future stock car races.* (That's the V-8 Commander with overdrive, remember.)

Next I tested the V-8 Commander with automatic transmission. Note the difference in times. In Drive all the way, zero to 60 took 18.5 seconds. Starting in Low and shifting to Drive at 35, zero to 60 took 16.2 seconds. In other words, automatic transmission cut nearly 3.5 seconds off the time.

The speedometer on this particular car was off. Sixty on the clock was actually 58.06. Ninety was 87.80. Actual top speed—or all I could get out of it on the track, anyway—was 96.77.

[*Continued on page* 164]

SHOP SMITH
REG. TRADE MARK
FOR ACCURACY

$189.50

FOR COMPLETE 5-TOOL UNIT WITHOUT MOTOR

Price effective January 1, 1951

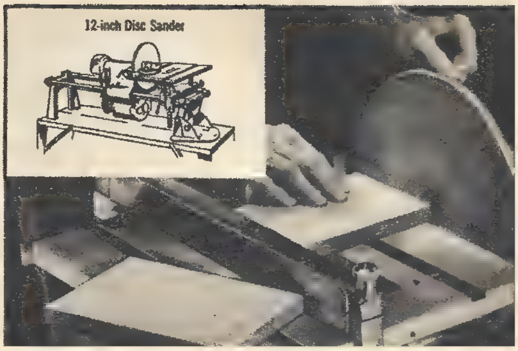
TAKE another look at the photo above. See those paper-thin strips? All four were sliced from the same piece of wood in sixty seconds *without changing the rip fence setting.* How? It's easy with SHOPSMITH. You can shift the *saw blade* as well as the fence—using SHOPSMITH'S exclusive micro-feed blade adjustment.

There's not much you can do with wood strips. What's important is the speed and extreme accuracy of SHOPSMITH'S fence-to-blade settings. And this is just one of SHOPSMITH'S many precision features.

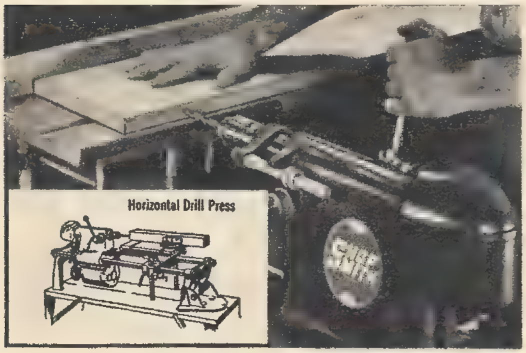
The disc sander, for example, feeds into the work, can be set to stop on a hairline. The vertical and horizontal drill presses have built-in jigs, unique micro-settings. The centerless ground steel ways are stress-tested at over a ton, assure absolute rigidity and accuracy in lathe work as well as in other operations.

Add 'em all up—accuracy, capacity, flexibility, rugged construction and precision features — and you'll begin to see why SHOPSMITH is America's most popular power tool. See SHOPSMITH demonstrated at leading hardware and department stores or any Montgomery Ward store. And for complete details and specifications, mail the coupon.

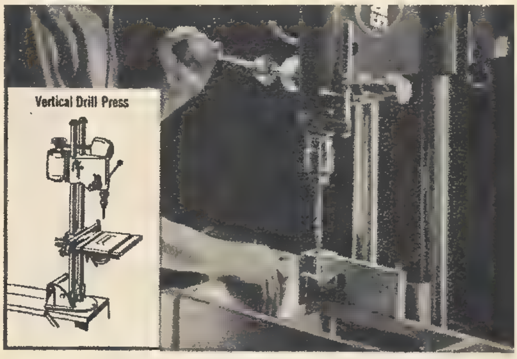
BLADE TO FENCE—48″. You won't find many saws under $200 that offer capacity like this. It means you can cut to the center of 8′ plywood panels, handle extra-long boards, trim doors, screens, storm sash. Table tilts, raises, lowers. Maximum depth of cut 2¼″.



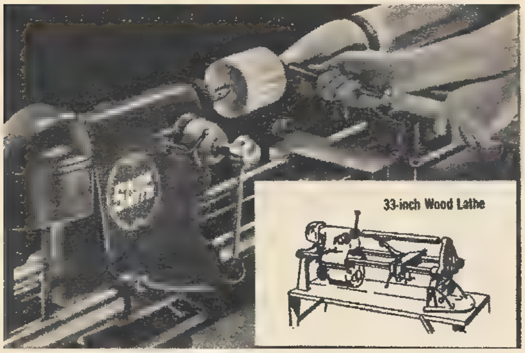
90° ON THE NOSE. SHOPSMITH as a disc sander is so accurate you can forget about your try square. Can be used as a jointer too. Work fed through at a slight angle (by cocking fence) comes out with a beautifully jointed edge. Sandpaper discs easily replaced.



PERFECT DOWELED JOINTS. No jigs required. Just lay the work flat on the table, feed drill from side. Dowel holes match perfectly. Horizontal drill is especially useful when drilling large, awkward work. Its capacity is limited only by the length of your workshop.

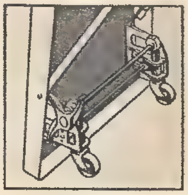


FLOOR MODEL, TABLE MODEL. SHOPSMITH as a drill press is both. Maximum clearance, table to chuck, 27″, floor to chuck, 55″. Jacobs key chuck takes drills up to ½″ diameter. Speeds range from 875 to 3500 rpm. 4″ quill feed. Easy to read, adjustable depth scale.



ROOM TO TURN IN. SHOPSMITH as a lathe has a 15″ swing—4″ more than most other heavy-duty lathes. It has a quick-set tool rest that always moves parallel to your work-piece. And it's the only lathe that lets you face the work while face-plate turning.

NEW RETRACTABLE CASTERS



. . . increase SHOPSMITH'S already great flexibility. They're easily mounted on any wood or metal bench. Easy to set, too, with three-stage foot levers that raise or lower unit. Your SHOPSMITH dealer has them. Complete set . . . $11.95.

ADDRESS:

SHOPSMITH, ***Dept. 152-N, at factory nearest you:***

12819 Colt Road, Cleveland 8, Ohio, OR
417 Montgomery Street, San Francisco 4, Calif.

Please send me the free SHOPSMITH booklet.

*Name*____________________________

*Address*__________________________

*City*__________________*State*________

MI Tests The '51 Studebakers

[*Continued from page* 161]

My test of the Champion was a short one because the car has undergone very few changes since I last gave it a workout. I did, however, get the biggest thrill of the day when I tested this one. Here's what happened:

Mr. Butzbach, head man of the proving ground and an old friend, turned the Champ over to me just as a customer would buy it, 24-pound wonder tires and all. For safety's sake I usually pump a few extra pounds into these super-globs but in this case I didn't—and thereby hangs my tale.

The photographer wanted action pictures and we agreed on some gravel skid shots. I drove the car down a steep hill at about 40 and threw it into a long slide, as simple a trick as there is in the book, especially if you've done it for years. But the shower of gravel wasn't dramatic enough so we decided to do it over again, faster. I made several more runs but none were fast enough to give the photos the oomph they needed. These super-blooper tires were giving me trouble when I tried to bring the Champ back under control after I finished the skid. There wasn't an air pump within a mile so I decided I'd find out just how dangerous a 24-pound tire could be in a real pinch.

I came down the hill between 50 and 55 and, at the agreed-upon spot, threw the car into a long, right-hand slide. When the time came to snap the car back and straighten her out on the road, it was no go. Those low-pressure tires were dragging over the gravel like bubble gum on Junior's chin. Even my own 250 pounds of weight didn't help. And here I was with a car out of control and heading for a deep ditch and a concrete culvert.

In a last-gasp, straw-grabbing maneuver I cut the wheel for a complete spin. The Champ's tail swung around and we missed the ditch by a hair. That ditch would have rolled me over for sure. Instead, I slammed through a fence and the only damage was a streak of orange paint down the side of the convertible's body.

This car had run hog-wild—and there was no excuse for it, except those marshmallow tires. This is not a slam at Studebaker. The same thing would have happened with any car equipped with similar tires. With pre-war tires I could have controlled the skid with ease. Frankly, I feel that if the "safety crusaders'" had the guts of a gnat they'd campaign against these freakish bloobs of glub and their man-killing properties.

In conclusion, I think these new Studebakers are right up there at the top with the best-performing American cars on the market today. The new engines are swell. Comfort, performance and durability are excellent and I believe the Studebaker people are due for one of the biggest years in their history. •

SPECIFICATIONS

MODEL TESTED:

1951 Studebaker Commander, 4-door sedan, V-8 (with automatic transmission)
1951 Studebaker Commander, 4-door sedan, V-8 (with overdrive)

ENGINE:

8 cylinder, V-type, OHV; bore 3⅜ inches, stroke 3¼ inches; piston displacement, 232.6 cubic inches; maximum torque 190 foot pounds @ 2000 rpm; brake horsepower 120 @ 4000 rpm; compression ratio 7 to 1

DIMENSIONS:

Wheelbase 115 inches; overall length 197½ inches; tread 55½ inches front, 54 rear; width 69 9/16 inches; height 62¼ inches; weight 3050 pounds; standard tire size 7.60x15

PERFORMANCE:

	(with automatic transmission)	(with overdrive)
0 to 30 mph,	6.0 seconds (L & D)	4.4 seconds
0 to 30 mph,	7.5 seconds (D only)	
0 to 50 mph,	12.0 seconds (L & D)	9.5 seconds
0 to 50 mph,	18.5 seconds (D only)	
0 to 60 mph,	16.2 seconds	12.8 seconds
0 to 70 mph,	20.0 seconds	16.9 seconds
0 to 80 mph,	27.8 seconds	23.1 seconds

Half-mile from standing start, 35.1 seconds; 31.2 seconds with overdrive
Top speed, 96.77 mph., 98.36 mph

SPECIFICATIONS

MODEL TESTED:

1951 Studebaker Champion, convertible

ENGINE:

6 cylinder, L-head; bore 3 inches, stroke 4 inches; piston displacement, 169 cubic inches; brake horsepower 85 @ 4000 rpm; compression ratio 7 to 1

DIMENSIONS:

Wheelbase 115 inches; overall length 197 inches; tread 56 11/16 inches front, 54 rear; width 69⅞ inches; height 61½ inches; standard tire size 6.40x15; gas tank 18 gals.

PERFORMANCE:

	(conventional transmission)	(automatic transmission)
0 to 60 mph,	17.6 seconds	23.1 seconds (using L & D)
0 to 70 mph,	26.6 seconds	

Half-mile from standing start, 35.1 seconds
Top speed, 82-85 mph

SPEEDOMETER ERROR:

At 60 mph on speedometer, actual speed 57.32 mph

Your Fishing Reel

[Continued from page 160]

Ratchet hub: Make the ratchet hub E from 1-in. diameter steel bar stock, preferably of carbon content. Rough out the diameters, drill and ream the inside diameter. If a $\frac{5}{16}$-in. mandrel is available, mount the blank on it to turn the ½-in. diameter to a snug fit with the spool. Recess the large end. Lightly scribe a 21/32-in. circle, turning the chuck by hand. Using the lathe index head mark off 20 radial lines crossing this circle. Prick-punch the intersections and drill twenty 3/64-in. holes. If an index head is not abailable, lay out in 18 to 22 holes as convenient. Hand-file teeth to rounded V-form as indicated. File a flat for the set screw in the spool hub. Harden if facilities are available, heating to a cherry red and quenching.

Spindle: Turn the spindle F from brass to a snug fit in the back plate and a free or running fit in the ratchet hub. Turn between centers to insure concentricity, allowing a little extra length for peening. Assemble with the back plate and peen to fill the taper. After peening, chuck by the spindle shaft to check alignment and face off the peened end to a rounded contour.

Pawl: Saw out pawl H and file by hand. Mount temporarily in a hole in the back plate ¾ in. from the center with a 4-36 screw. Slide the ratchet on the spindle and shorten pawl if necessary to give free click in each direction.

Spring: This spring may be made from beryllium-copper, brass or steel. It is bent approximately as shown and adjusted later to the proper tension.

Handle, Spacers, Cap, Cleat: The handle N is turned from aluminum bar stock. Spacers J-K from brass, drilled and tapped on both ends. The cap M is turned from steel, and cleat L is made from $\frac{1}{16}$-in. brass strip, cut to shape, drilled, countersunk, bent and filed to a taper on the ends to fit the rod.

To assemble: Use 4-36 flathead brass screws. Chuck individually, and file to oval heads. Thread screw for the pawl through the back plate and secure with a nut filed to 3/64 in. thickness. Peen over to secure the pawl but allow freedom for click effect. Mount the spring and adjust tension, testing with the ratchet hub.

Assemble handle to outer spool end with thin nut for spacer. Peen on inside end and file flush. If necessary, disassemble and dress spool hub to promote accurate alignment of spool ends with back plate and ring. Dress the 3/64-in. recess in cap to permit a free-running spool without end play and fasten to the spindle with an oval-head 6-32 brass screw. •

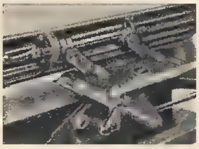
Built BIG!
TO LAST YOU A LIFETIME

Atlas
6"
JOINTER
32"
42"

TEAM IT UP WITH YOUR SAW

You're equipped for construction, remodelling and the finest cabinet work of *every* kind with this big new Atlas 6" jointer in your shop. It planes a mirror-smooth finish, bevels, tongues, rabbets, end-joins, edges *in seconds!*

Look at the size of the precision-ground table — 42" x 6-7/16" — for easier work on long boards. Note the long fence properly supported *at the center* for absolute rigidity and accuracy. New features include rabbet width scale, simultaneous blade height control, removable cutter head, adjustable guard tension. Send coupon for catalog with complete details.



Rigid fence support, rabbet width scale.

Cutterhead removes for resharpening blades.

ATLAS PRESS CO.
152 N. Pitcher St., Kalamazoo, Mich.

Atlas Power King

MATCHED PRECISION TOOLS FOR WOODWORKING AND METALWORKING

ATLAS PRESS CO.
152 N. Pitcher St., Kalamazoo, Mich.
Kindly send latest catalog showing 6" jointer.

Name________________
Address________________
City, State________________

For Loose Caster Guides

Remove the guide, fill the hole with a putty-like mixture of Smooth-On No. 1 Iron Cement and drive the guide back in. It will stay in place, because Smooth-On, in hardening, expands slightly and takes hold tight. Use Smooth-On for tightening other loose parts and also for stopping leaks in boilers, furnaces, piping, radiators, etc. Buy Smooth-On No. 1 in ¾ oz., 7 oz., 1 lb., 20 or 100 lb. size at your hardware store. If they haven't it, write us.

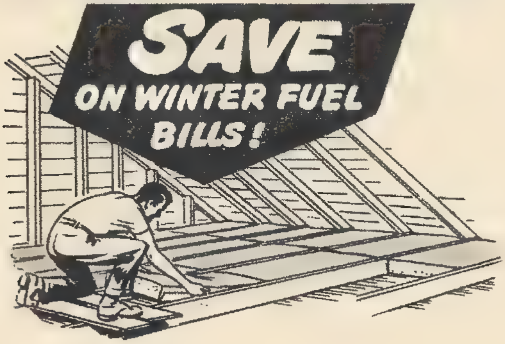
FREE Repair Handbook

Shows how to save time and money, making many household repairs. 40 pages. 170 pictures. Clear directions. Send today. SO-313

SMOOTH-ON MFG. CO., Dept. 69A
570 Communipaw Ave., Jersey City 4, N. J.

Do it with
SMOOTH-ON
THE IRON CEMENT OF 1000 USES

SMOOTH-ON CEMENTS
For Motor Car and Boat, Home, Factory and Power Plant



WANT to chop $25—$50 off your heating bills this winter, and enjoy greater comfort at the same time? Then insulate your attic or top floor ceiling with new fireproof Gold Bond Rock Wool Insulation. A cinch to install. Comes in 2′ or 4′ Enclosed Batts and new 8′ Sealed Blankets, in standard widths that fit snugly between attic floor joists or roof rafters. Completely enclosed for easy handling with Vapor Barrier on face side. Keeps furnace heat in and summer heat out. Get Gold Bond Enclosed Batts or Sealed Blankets from your dealer today. And for best results be sure to order them "full-thick"! Free descriptive booklet sent on request. Write Div. Y, Dept. MI-1.

Available at your local Gold Bond lumber and building materials dealer!

NATIONAL GYPSUM COMPANY
BUFFALO 2, NEW YORK

30 Minutes Of Your Life

[Continued from page 71]

diately after the Bikini tests, teams of men boarded heavily contaminated ships and pulled out the animals which had been placed on board to determine radioactivity effects. These men stayed several minutes at a time and nothing happened to them.

So, the third rule: *Stay in your shelter until it is time to leave.*

Those are the three simple, basic rules. Now, let's get more specific.

IF YOU ARE IN YOUR HOME . . . first you must try to make it flameproof. An atom bomb can set fires more than two miles from the point of detonation since it pours one-third of its tremendous energy into thermal or heat radiation. Take the following precautions: put dry leaves, trash, oily rags, any readily inflammable material into metal cans and cover them tightly. Shut off all utilities—the oil burner, the pilot light on the gas stove and water heater. Batten down the draft doors of your coal-burning furnace and wood stove. Then prepare for a fire just in case—make sure a stirrup pump and a hand fire extinguisher are available and place pails of sand and water at strategic locations.

Second, you must make your home as air-tight as possible. Close all doors, windows, chimney vents, lock shutters and draw curtains, drape sheets or other light-colored material around them. Radioactive wastes can enter your house through the tiniest fissures.

Then go to your shelter which will be either the basement or a small area dug into the ground from the side of the basement. Even before the alert, you should have prepared your shelter with emergency equipment, including a flashlight in the event that the electricity is knocked out, a supply of canned food and an axe to chop your way out if the entrance is sealed off by the blast.

In addition, you should have a first aid kit, containing a burn salve, soft cloth, gauze, absorbent cotton and an antiseptic. If you suffer any cut, no matter how trifling, wash and bandage it immediately to prevent radioactive particles from entering and damaging the bloodstream.

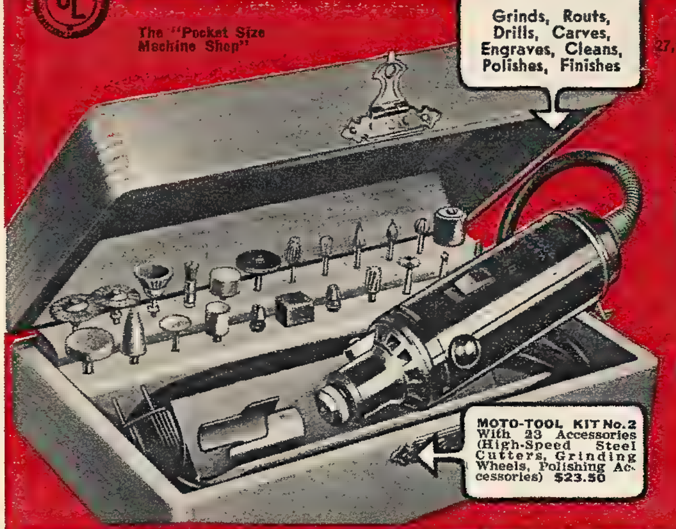
You should have drawn several gallons of clean water and stored them in the shelter for use directly after the raid because there is a possibility that the water in your pipes may become dangerously radioactive. Don't boil it because boiling concentrates rather than removes radioactive particles.

[Continued on page 168]

MOST PRACTICAL TOOL YOU COULD EVER OWN!

DREMEL ELECTRIC MOTO-TOOL

The "Pocket Size Machine Shop"


Grinds, Routs, Drills, Carves, Engraves, Cleans, Polishes, Finishes

MOTO-TOOL KIT No. 2 With 23 Accessories (High-Speed Steel Cutters, Grinding Wheels, Polishing Accessories) $23.50

Approx. 27,000 R.P.M.

MOTO-TOOL No. 2 with one emery wheel point $16.50

Great for Hobbyists

Saves Time and Labor

IMPORTANT!

Don't confuse Moto-Tools and Accessories with so-called "bargain offers." Compare Dremel, feature for feature, with any make. If Dremel products are not superior in every way, we don't want you to buy.

Moto-Tool No. 2 performs many jobs faster, better, economically. Works well in wood, plastics and metal for drilling, carving, engraving, buffing, etc. For model-making it's a **must**. For home maintenance and repair jobs you'll wonder how you ever got along without it. And for general all-round workshop operation it's a tool every craftsman finds indispensable. We urge that you try Moto-Tool on Dremel's 5-day money-back offer. Buying the complete Kit No. 2 saves money and opens the door to years of profitable results.

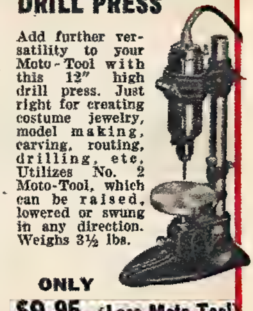
WIDELY USED IN INDUSTRY—

Moto-Tool is backed by over 14 years of exacting use in plants like General Electric, Ford, Remington-Arms, Nash-Kelvinator, etc.

CHECK THESE MOTO-TOOL FEATURES

Oil-less, sealed bearings • Patented automatic chuck lock pin • Oversize armature shaft, hardened, ground, polished • Shockproof, bakelite housing • Dust filtered air cooling system • Dynamically balanced armature • Handy hanger hook • Sturdy 110-120 Volt AC-DC motor. Weight only 13 oz.

Portable DRILL PRESS



Add further versatility to your Moto-Tool with this 12" high drill press. Just right for creating costume jewelry, model making, carving, routing, drilling, etc. Utilizes No. 2 Moto-Tool, which can be raised, lowered or swung in any direction. Weighs 3½ lbs.

ONLY

$9.95 (Less Moto-Tool)

FUN FOR BOYS FROM 8 TO 80

DREMEL *Electric* COPING SAW

CUTS SCROLLS LIKE MAGIC—SANDS AS IT SAWS

BLADE FACES 4 WAYS
PAT. No. 2233082
FREE PROJECT PLANS

JUST GUIDE IT!

Only **$5.85** with 3 saw blades

. . . for 6 useful projects packed with each saw

SAFE! AS A HANDSAW

For home, hobby, repair work—no other tool pleases so much for so little cost. Works in any direction—delivers 7,200 strokes per minute smoothly, effortlessly. Saws through 3/4" medium-hard wood at a foot-a-minute speed. Touch-of-the-trigger, foolproof action. Only 2 moving parts, never needs oiling. Uses 110-120 v. A.C.

BIG VALUE!

MOTO-TOOL KIT NO. 1

Only $17.50

Contains the lighter Model No. 1 Moto-Tool and 34 practical accessories (steel cutters, grinding wheels, etc.) in attractive, lacquer-finish wood case ---- **$17.50**

MOTO-TOOL No. 1 with one emery wheel point --------- **$9.85**

WHERE TO BUY DREMEL TOOLS

Dremel Tools are sold everywhere. If your dealer cannot supply you, send remittance in full and we will ship postpaid. Or send only $2. and pay postman balance plus postage and fee. **Money back if not delighted after 5 days' trial.**

DREMEL MFG. CO. DEPT. 141-A RACINE, WIS.

Set Up Your Own Welding Business—Save $300 to $500

"Build Your Own" big capacity arc welder and save! This HOBART generator plus your own hook-up builds a welder that will earn hundreds of extra dollars for you.

Get Into Big Profits on Repair and Contract Work

Let Hobart help you "build your own" welder and save $300 to $500 over cost of factory-built unit. Select the type and capacity generator you want from our complete line and belt or couple to a good used auto engine. Don't miss this opportunity. Write for FREE booklet.

HOBART

HOBART BROTHERS CO., BOX SM-11 TROY, OHIO

"One of the world's largest builders of arc welders"

BUILD YOUR OWN TILTING ARBOR SAW!
SAVE $50 OR MORE

Exclusive GIL-BILT Build-It-Yourself Features

- No machining—build easily with hand tools only
- No blueprint reading—step-by-step pictorial plans, full scale patterns, actual photographs
- Sturdy wood, aluminum, and steel construction
- Capacity and performance of commercial saws selling for $60 and up

GIL-BILT 10-INCH TILTING ARBOR SAW

- 27x28 in. table, 13½ in. capacity in front of blade
- 10 in. blade cuts 3¼ in. deep, tilts full 45 degrees
- Floor model 34″ high table always stays level
- New Departure ball bearing arbor, ¾″ precision shaft turned down for ⅝″ bore blades, alum. housing, shipped ready to run
- Jackscrew and 4½ in. dia. handwheel lowers and raises blade
- Cast aluminum miter gauge and self-aligning rip fence guide

GIL-BILT Metal Parts Kit includes Plans, ball bearing arbor, miter gauge and bar, rip fence guide, dado insert, lock knobs, jackscrew mechanism and handwheel, and all other metal parts (less blade) ____________________$20.95
Same Kit with 10″ Combination Blade___ 24.90
Same Kit with 8″ Combination Blade___ 23.90

GILT-BILT 12-INCH BAND SAW

- Cuts to center of 24 inch circle
- Handles stock up to 6 inch thick
- 18x18 inch table tilts 45 degrees
- Lower wheel and drive pulley runs on sealed New Departure Ball Bearings; Upper wheel runs on two ⅝″ bore Oilite Bronze bearings.
- Upper wheel tension and tilt mechanism of cast aluminum, completely assembled.
- Upper and lower blade guides. Each has ball thrush bearing, self-lub bronze jaws.
- Rubber tired wheels. Choice of cast aluminum or make-your-own wood wheels on metal hubs.
- Uses standard 78 inch blades up to ⅜ inch wide.
- Fully enclosed mechanism for utmost safety.

GIL-BILT Metal Parts Kit includes Plans, rubber tires, ¼ inch blade, hubs for wood wheels, ball bearing spindle, tilt mechanism, guides, table tilt segments and all other metal parts____________________$16.95
Same Kit with two machined ready-to-install 12″ cast aluminum wheels ______________________________________$20.95

Return in 10 days for refund if not satisfied.

(Prices include postage within 600 miles. Over 600 add 5%)

Also available—Plans and Parts Kit for 8″ Tilt Table saw. Order Plans at $1.00 each—sent postpaid anywhere in the world or write for FREE descriptive catalog.

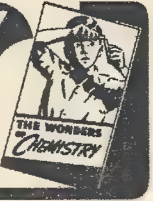
GILLIOM POWER TOOLS P. O. Box 1-RA, Lambert Field
St. Louis 21, Missouri

BOYS—IT'S FREE!

"THE WONDERS OF CHEMISTRY"

This exciting new book shows how to amaze your friends with chemical magic, describes many fascinating home experiments, tells of fun, thrills and big future opportunities for boys who know chemistry. Special atomic energy feature. Send today!

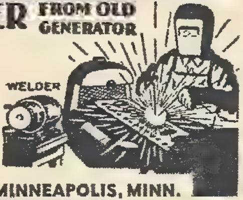
THE PORTER CHEMICAL COMPANY
24 Prospect Avenue Hagerstown, Maryland



BUILD ARC WELDER FROM OLD GENERATOR

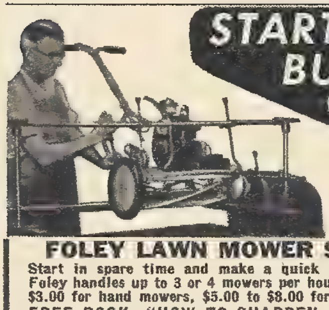
WE SHOW YOU HOW
Light or Heavy Work

Produces 75-200 amperes. Takes no previous experience or hard work to make one of these welders. Complete plans 35c. Send for your **PLANS** today and we'll include FREE our Big NEW Catalog listing hundreds of electrical bargains.



LEJAY MFG. 1314 LEJAY BLDG. MINNEAPOLIS, MINN.

START A BUSINESS this Quick Way



"I have taken in 100 mowers in 5 weeks since I got my Foley," says George C. Wise.

FOLEY LAWN MOWER SHARPENER

Start in spare time and make a quick CASH PROFIT. The Foley handles up to 3 or 4 mowers per hour—prices run $1.50 to $3.00 for hand mowers, $5.00 to $8.00 for power mowers.

FREE BOOK—"HOW TO SHARPEN POWER MOWERS." Prices $97.50 to $159.50—easy payment terms available. Write today for FREE PLAN on lawn mower business. No salesman will call.

FOLEY MFG. CO., 106-1 Foley Bldg., Mpls. 18, Minn.

30 Minutes Of Your Life

[*Continued from page* 166]

As soon as the water supply has been okayed after the raid, take a shower. But a good one! Radioactivity can cling to you, but only a bit more strongly than ordinary dust or dirt. Scrub yourself thoroughly with soap and water, paying particular attention to your fingernails and hair. Then don a complete change of clothing, burying your old ones.

IF YOU ARE IN YOUR OFFICE . . . leave the upper stories as quickly as possible. Not only are you in danger of having the floor fall out from under you, but there are few barriers in the form of steel, concrete and wood to shield you from the radiation. Head for the basement as soon as the siren sounds and remain as close as possible to heavy, supporting columns to avoid the danger of collapsing beams. Stay away from all entrances and all windows. If there are heavy steel doors and shutters, close them.

IF YOU ARE WALKING ON THE STREET . . . get out of the open. Remember that flash and flame burns killed 50 per cent of the 106,000 persons who died in the atomic attack on Hiroshima and Nagasaki and accounted for 75 per cent of all casualties. The bomb's heat rays travel in a straight line—so all you have to do is get inside.

Head for the nearest official shelter. If there aren't any, a subway—the deeper the better—will do as well. Or enter the nearest, strongest-looking building and head for the basement. If you are crowded out of there, get against some partition in some interior, as low to the base of the building as possible.

IF YOU ARE TRAPPED ON THE TOP FLOOR OF A BUILDING . . . and descent to the basement is prevented by jammed elevators and stairs, don't join the mob battling to get down. Proceed to a point as close to the center of the building as possible and lie against a wall or strong supporting column, out of line of the windows. Or crawl under a table, sofa or desk which would provide protection against flying glass.

IF YOU ARE IN A CAR . . . do not try to flee the scene. You will speedily find yourself caught in a maelstrom of traffic. Park your car at once, but do not obscure the traffic lanes. Leave your keys in the auto in case it has to be moved to make way for emergency equipment. Close the windows and head for shelter.

IF YOUR ARE IN A TROLLEY, BUS OR SUBWAY . . .

follow the evacuation instructions of the engineer or driver. If you are on a subway platform, remain where you are.

IF YOU ARE IN A CHURCH, THEATER OR SCHOOL . . .

all these places should have shelters in their basements and specific people whose job it will be to lead you to them. If they do not or if there is not time to reach the shelters, lie down as close to the outer walls as possible.

IF YOU ARE ON THE BEACH . . .

the chances are that you won't be too far from cover of some sort. But get your clothes on first. Clothing will help reduce the danger of flash burns. If at all possible, wear long trousers or slacks, a loose-fitting blouse and a hat. Light-colored clothes are much more effective shields against burns than dark ones. But in any event, cover as much of your body as you can, then take cover in a shelter. Buildings around a beach are usually of comparatively flimsy construction, so judge whether you can get far enough inland to reach a strong building in the time you have. If you can't, then find shelter where you are. Get into a rock depression, behind a massive tree or, if nothing else is available, dig yourself a foxhole and lie in it face down.

IF YOU ARE FISHING ON A LAKE . . .

gauge your distance from shore. Can you make it? If you can, head for the nearest heavily-wooded inlet or largest rock and snuggle against it. Select a rock on the side facing away from the city, because that's where the enemy is aiming his bomb.

If you are too far out to make shore, dive into the water and stay there until the explosion comes, keeping averted the side of your head facing the city.

IF YOU ARE A FARMER IN YOUR FIELDS . . .

proceed to the closest atom-bomb shelter. If there is none, even a furrow in a plowed field will give you some protection if you lie in it.

If the atom bomb is ever dropped on your city, there is no doubt that it will cause devastation on a scale you have never seen before. But that is no reason for you to give up hope for your own life.

You have read about the things which you can do to safeguard yourself and your family. They will increase your chances of survival a hundredfold. When and if the time comes, remember to do them and the 30 minutes before the bomb falls will certainly prove to be the most important 30 minutes of your life! •

Handy Hank says:
"Try these slick tricks with PLASTIC WOOD"

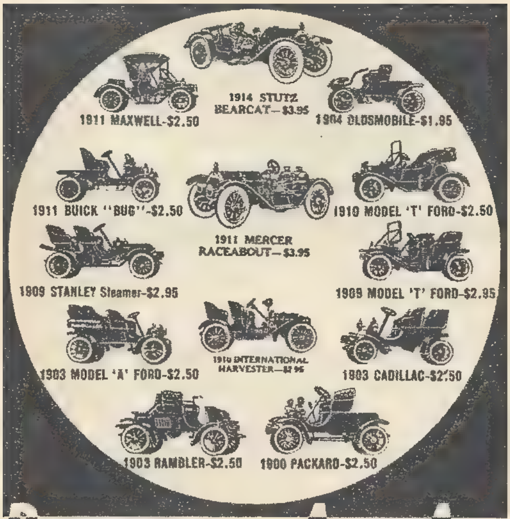
Fill cracks in chairs—
Makes loose joints firm, sands to a smooth finish!

Reset loose hinges—
Replaces rotted wood, tightens loose screws . . . *easy* to apply!

Repairs broken toys—
Mend cracks, nicks! Smooth finish!

Also useful in filling cracks in floors, nail and screw holes, repairing loose tiles. *Handles like putty . . . hardens into wood!*

PLASTIC WOOD®
A CELLULOSE FIBRE FILLER
IN CANS OR TUBES
DOZENS OF OTHER USES


1914 STUTZ BEARCAT—$3.95
1911 MAXWELL-$2.50
1904 OLDSMOBILE-$1.95
1911 BUICK "BUG"-$2.50
1911 MERCER RACEABOUT—$3.95
1910 MODEL 'T' FORD-$2.50
1909 STANLEY Steamer-$2.95
1909 MODEL 'T' FORD-$2.95
1903 MODEL 'A' FORD-$2.50
1910 INTERNATIONAL HARVESTER—$2.95
1903 CADILLAC-$2.50
1903 RAMBLER-$2.50
1900 PACKARD-$2.50

Build "OLD TIMERS" Antique Autos

FREE! Write for Your Copy of Our 4-Color FOLDER

WHAT A THRILL to build your collection of these famous antique cars—each one easy to assemble with pre-fabricated parts! Above we sketch the 13 cars of bygone days—so colorful, historical and authentic—actual ¾" scale models! They range in length when complete from 6½" to 10½"

SEE them at your hobby, toy or department store, or write to us. Add 25c for postage and handling; no C.O.D.'s, please.

Hudson Miniatures' "OLD TIMERS"
SCRANTON HOBBY CENTER, Dept. 2, Scranton 10, Pa.

Print Your Own
Cards, Stationery, Advertising, labels, circulars, photo and movie titles, church work, tags, etc. Save money. Sold direct from factory only. Raised printing like engraving, too. **Print for Others, Good Profit.** Have a home print shop. Easy rules supplied. Pays for itself in a short time. Write for free catalog of outfits and all details.
Kelsey EXCELSIOR Presses
KELSEY PRESSES, N-9, Meriden, Ct.

DRAINS Cellars, Laundry Tubs; CIRCULATES Oil; IRRIGATES Gardens

Original "Type P" Pump has 2400 GPH capacity. 360 GPH 75' high, or 1500 GPH for 25' well. Use any ⅛ to ½ HP motor. DOES NOT CLOG.

Only $6.95 postpaid if cash with order. (West of Mississippi, add 50c.)

SATISFACTION GUARANTEED OR MONEY BACK! $6.95

LABAWCO PUMPS, BELLE MEAD 30, N. J.

SENSATIONAL New ZIP SAW
ONLY $39.95

Completely self-contained portable electric hand saw—heavy-duty perfectly-balanced. Full 6¼" blade, mitre gauge, depth gauge and rip fence. Mitres 2 x 4's at any angle —90°, 15°, 30°, 45°. Depth of cut: 2⅛". Motor is 5200 rpm universal AC-DC, 110-120 V. (Beautiful Blue Steel Case, $5.95 extra) Send cash, check or money order for this sensational new saw today!

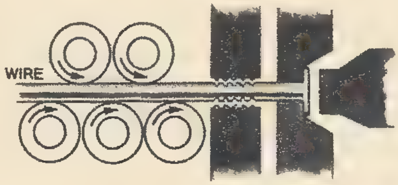
BERTROM D. ENGINEERING AND SUPPLY CO.
3121 Main Street Kansas City, Mo.

The Great Joiner

[Continued from page 109]

than 20,000 people were employed at making nails.

The first nail rod mill in the American Colonies was built at Milton, Massachusetts, in 1710. This mill supplied rods to the pioneers who made them into the nails that were used in our early buildings. Many of these handmade nails were found by the workmen who are now engaged in the restoration of the old original Erasmus Hall Academy. This building was erected on its present site, the Erasmus Hall High School campus, in Brooklyn in 1787.



Dies close on the wire while a hammer blow is forming the head. Grooves in shank are formed by the dies.

In 1777, Jerimiah Wilkinson of Cumberland, Rhode Island, invented a machine that could cut nails from a sheet of cold metal. In time this new process largely replaced the old hot forging method.

Sometime between 1830 and 1840 an entirely new development, nails-from-wire, originated in France and spread to Germany and to England. Within a few years Germany alone could produce all of the nails that she could use and in addition export over 50,000 tons a year. In 1851, William Hassall of Brooklyn, set up the first nails-from-wire process machine to be used in this country. He constructed his machine from ideas received from a similar machine seen in operation in Birmingham, England.

The steel wire nails began to dominate the market soon after Father Joseph Goebel of Covington, Kentucky, imported a nail making machine from Germany in 1875. As his business expanded he formed the Kentucky Wire Nail Works. In a short fifteen years' time the manufacture of cut nails had practically ceased.

The modern nail starts as a steel ingot about 6 ft. long by 20 in. square. This is run hot between the rolls of the blooming mill where it is worked down to a long bar (called a bloom) measuring 6 to 8 in. square. When the bloom becomes a 2 to 4 in. bar it is known as a billet and when reduced by further rollings, a rod. The beating that the original steel ingot has received to this point is only the beginning as the rod must now be drawn into a wire form.

The rod is pulled through progressively smaller and smaller tungsten carbide dies. The diameter is not only reduced to the desired wire size but the steel is also toughened and stiffened. This process requires powerful winching drums and near diamond hard dies.

As wire, it is now sent to the nail machines. Some of these high speed modern miracles are capable of producing nails at the rate of 550 per minute. While they are a good example of the speed possible in automatic production, the skill of the hand craftsman is still essential. These craftsmen are the master die makers who make the dies that form the heads and the points of the nails.

When the wire reaches the nail machine it is gripped by fingers and fed forward a distance that is determined by the length of the finished nail. Dies close on the wire while a hammer blow is forming the head. If the head is to be countersunk it is forced back into a tapered hole. The grooves in the shank are formed at this same time as these dies grip it firmly. If the nail is to be barbed, these are put on before the wire reaches the nail machine.

After the head is formed another set of dies pinch off and point the nail at the desired length. These pointing dies nearly but not quite meet or they would become blunted very rapidly. As a result a small piece of metal remains on the point of the nail. This is removed and the nail is also polished by tumbling hundreds of them in sawdust before they are kegged for shipping.

Most of the nails produced are given a diamond point. The gradual taper on this holds well and it will not cause splitting except in the denser woods.

The blunt-pointed nail is the one that is made for nailing in the denser woods. While a sharp point will push the fibers apart and cause the wood to split, the blunt point breaks them and eliminates this danger. It is used in laying hardwood floors, in attaching hardwood trim, and in making boxes and crates.

The chisel point looks something like a screwdriver and is used in driving large nails in hard wood as the sharp edge cuts through the fibers. This makes them practically as easy to drive as the diamond point but their holding power is not as great.

The needle point is designed primarily for fast hand nailing such as is necessary in the manufacture of boxes. A light tap from the hammer starts the nail well into the wood eliminating the necessity for guiding it with the hand.

[*Continued on page* 178]

Made
$900
IN SPARE TIME

with

FOLEY* automatic SAW FILER

** Trade Mark Reg. U. S. Pat. Off.*

"I did very well last year with my Foley equipment, about 950 saws and 240 lawn mowers, in my spare time. About $900 for me." Leo H. Mix. Len Crego says: "I have done 4 or 5 thousand saws in my spare time in the 4½ years since I got the outfit, and they are all coming back."

Make up to $2 or $3 an hour in Spare Time. With the high prices of food, clothing and everything else, just think what you could do with extra money every week! With a Foley Automatic Saw Filer you can file hand, band and circular saws better than the most expert hand filer. "The first saw I sharpened with my Foley Filer came out 100%"—writes Clarence E. Parsons. Every saw you sharpen with the machine accuracy of the Foley Saw Filer is an ad that brings you more customers. Cash business, no canvassing. No eyestrain, no experience needed.

FREE BOOK
INDEPENDENCE AFTER 40!

Shows just how you can start at home in spare time in your basement or garage. Just think—with a small investment, no overhead, no stock of goods to carry, you can get right into a cash business—and later on develop into a full-time repair shop. Send coupon today—no salesman will call.

INDEPENDENCE
after
40!

Send Coupon for **FREE BOOK**

FOLEY MFG. CO., 115-1 Foley Bldg., Minneapolis 18, Minn.
Send FREE BOOK—"Independence After 40."

Name ....

Address ....

brand **NEW** *just off the press*

CONSTANTINE'S MANUAL FOR WOODWORKERS HOBBYISTS HOME OWNERS 116 PAGE BOOK

a complete catalog!

AND REFERENCE BOOK OF WOODS, VENEERS, LEATHER, METAL, PLASTICS, ETC.

This is the biggest, most complete manual we ever published. More new items, on leathercraft, decorative metals, wood finishing, hard to get items of all kinds . . . in addition to our power and hand tool sections, upholstery, picture frame mouldings, rare and domestic woods, veneers, lumber, inlay panels, 83 inlay designs, inlay borders, all in full natural color, plus a full color wood identification panel of 60 different woods suitable for framing. All items at lowest prices from America's Biggest Supplier to Craftsmen.

Send today for your copy of the hobbiest's most helpful book.

SEND FOR YOUR COPY TODAY

FREE

With each copy of our Master Manual, you get a year's subscription to Chips and Chats, a breezy bimonthly to keep you up-to-date on what craftsmen are doing.

ALBERT CONSTANTINE & SON, INC., DEPT. MI-I
797 East 135th St., New York 54, N. Y.

Enclosed find 25¢ for a copy of your "Master Manual" and a FREE one year's subscription to Chips and Chats.

NAME____________________

ADDRESS____________________

CITY__________ STATE__________

Pioneers **AIR RIFLES** **BENJAMIN** *Leaders* **AIR PISTOLS**

SHOOT WITH SAFETY

BE SAFE—SHOOT WITH COMPRESSED AIR—ALWAYS READY No Cartridges or Tanks to Replace or Recharge. If you want the most PRACTICAL GUN to use anywhere—inside or outdoors—get a SAFE—CLEAN—ECONOMICAL BENJAMIN with Adjustable Power and Amazing Accuracy. Send for Free Folder of Latest Models Today.
BENJAMIN AIR RIFLE CO., 830 MARION ST., ST. LOUIS 4, MO.

THRILLS! TRAVEL! ADVENTURE!

RIDE THE NEW 1951

HARLEY-DAVIDSON *Hydra-Glide*

Share in this glorious fun! Make new friends. See faraway places. Be free to go when and where you wish . . . with the exciting new 1951 Harley-Davidson Hydra-Glide, world champion! Amazingly smooth, powerful, beautiful. See your dealer. Write for FREE ENTHUSIAST magazine and literature.

HARLEY-DAVIDSON MOTOR CO.
Dept. MI, Milwaukee 1, Wisconsin

Easy and Cheap to Operate

SAVE TIME, WORK, MONEY!

SHAW 'DU-ALL' and "PEPPY PAL" TRACTORS

PLOW

CULTIVATE

These rugged walking or riding tractors are ideal for farm, truck garden, orchard, poultry farm. Operate on a few cents an hour. A child can handle them.

DO DOZENS OF JOBS Both riding and walking tractors quickly and easily plow, cultivate, harrow, disk, bulldoze, spray, haul, grind, saw wood, etc.

LOW FACTORY PRICES Buy direct or through your dealer. Year's guarantee!

RIDING TRACTORS 4 models from 5 to 12½ H.P., 58 in. wheelbase, 36 to 52 in. wide, 24 in. plant clearance. Hand or electric starter. Walking Tractors 1½ to 5 H. P.

FREE Illustrated folders giving complete details and price lists—write today!

SHAW MFG. CO.
2901 FRONT ST., GALESBURG, KANS.
668ME NORTH 4TH ST., COLUMBUS, O.

Chrysler Station Wagon

[*Continued from page* 91]

Unfortunately, and for some unexplained reason, the hay caught fire at this untimely instant and when Uncle Charlie died a few years later, leaving quite a sizable bundle, my name was strangely missing from his will. I guess he was really sore.

Regardless of who invented the species, all modern station wagons started out to be trucks for dudes. When the polo-and-petunia crowd latched on to them, they painted whimsical slogans on the front doors, like Mulligan's Half Acres, or Briar Patch Farm or, perhaps, Howard's Home for Wayward Girls. As the years rolled by the original name "station wagon" persisted but the vehicle itself assumed two distinct and different forms, one for genuine utility work and the other for impressing the neighbors.

Today the *real* station wagon is a rough-and-tumble, all-around working farmer and rancher's vehicle used for hauling the kids to school or fetching the old man back from the saloon on Saturday nights, for carrying heavy loads and doing hundreds of he-man jobs. Most of us know it as a quarter-ton or half-ton pick-up truck. Meanwhile, the other kind of "station wagon" has become more and more of a Fancy Dan passenger car which could haul the cement bags and manure if it had to but generally doesn't. Chrysler's Town and Country is a fine example.

The Town and Country is exactly what the name implies. No limousine made in America offers more luxurious appointments. The huge handle to lower the rear window in hot weather looks like a winch you might expect to find on a millionaire's racing sloop. The

An ingenious tail gate latch is one of the minor "Chrysler touches" that auto expert McCahill likes.

hardware is all definitely masculine with faint overtones of Crane plumbing. The tail gate is built like the Golden Gate Bridge and if your favorite polo pony would fit inside, I'm sure his weight wouldn't strain it in the least.

A good Chrysler touch is the side venting of the tail pipe which, unlike so many other wagons, diverts the exhaust fumes so they don't make the passengers seasick. Another Chrysler invention is the crash pit, or padded bolster, around the entire dash which this company introduced more than 20 years ago in its Imperial roadster. Chrysler dropped this feature for a number of years only to have Tucker and others pick it up again. As for headroom in this Town and Country, I believe you could wear a king-size top hat to the local horse show without a ruffle to your aplomb. The all-steel body is far safer in a crackup than a wooden one and is as easy to clean as a sedan—whereas wood, to be kept right, should be hauled into dry dock like a yacht and revarnished every six months.

The rear passenger seats fold forward and upside down, making additional hardwood floor surface when wanted. Chrysler will supply a mattress for this which means sleeping accommodations ample enough for any two sportsmen or mobsters on the lam. This makes the Town and Country tops for guys who like to get away from it all with guns, fishing tackle and bird dogs. The overall length of this job is 211 inches on a 125½-inch wheelbase chassis, which means you're not driving a scooter. This is really a big-time barouche that literally screams "best of its kind" from almost any angle.

The one I tested was equipped with Prestomatic Fluid Drive transmission (this is optional equipment) which is Chrysler's answer to Hydra-phobia for guys and jills who abhor manual shifting. It is a beautiful hack to drive, providing all things such as size and functional properties are considered. You can't whip this caravan around a corner the way you can the 111-inch wheelbase Plymouth. But then, if you can afford this job you're probably at an age to be slowing down a bit on the curves anyway.

The engine is a bit under-powered. It is a 250 cubic-inch plant, developing 116 horsepower at 3600 rpm, which is on the small side for a car that may very well be called upon to carry a large number of people and hundreds of pounds of luggage. You can make book it's a heavy rig with even half a load. Actually, the engine is the Chrysler Royal whereas the 135-horsepower, 323 cubic-inch Imperial engine would, in my opinion, make it much more of a buy. Naturally, you don't buy a car of this design for flash performance

[*Continued on next page*]

Ideas out of this World

. . . yours with these Wizards with Wood

Ideas for bonding wood! Ideas for finishing effects! Want 'em? Then send postcard for leaflets on Firzite, Satinlac, Weldwood Glue — used by professionals and offered by United States Plywood Corporation. . . .

Glue That's Stronger than Wood

To make things or fix things, use Weldwood Glue for all wood-to-wood bonds. Makes joints stronger than the wood itself. Mixes easily with water. Stain-free, rot-proof . . . highly water-resistant! 15¢, 35¢, 65¢, 95¢ and larger sizes.

WELDWOOD
PLASTIC RESIN GLUE

A MUST for Finishing Fir Plywood

Tame that wild grain with FIRZITE. It tight-seals the pores . . . virtually prevents grain rise or checking . . . readies the surface satin-smooth for paint, stain or enamel. (For blond, pickled, wiped or tinted effects use White Firzite).

FIRZITE

Newer than Shellac or Varnish

Pints, Quarts, Gallons

For "natural wood" finishes on furniture or woodwork, there's nothing like Satinlac. Brings out the natural grain and color beauty of any plywood or solid wood. Avoids that "built-up" look, and will never turn yellow or darken with age. "Water-white", easy to brush or spray, dries ready for next coat in 2 or 3 hours.

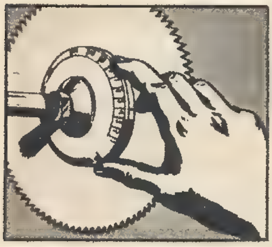
SATINLAC

Ask for Weldwood Glue, Firzite and Satinlac at hardware, paint or lumber dealers.

Send post card for interesting glue and finishing leaflets.

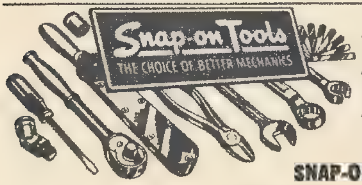
UNITED STATES PLYWOOD CORPORATION
Dept. 170, 55 West 44th St. • New York 18, N. Y.

Better, Easier, Quicker
GROOVE CUTTING or CABINET-MAKING
with Warren DADO SAWING WASHERS



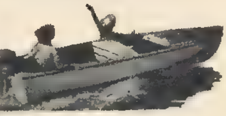
Just dial
DESIRED CUT
Cut accurate, parallel grooves—any width, any angle. Just dial desired width with Micromatic adjustment. Cuts smooth and clean—no burning or chewing to mar fine wood. Just four simple washers—can be left on blade for straight cuts to strengthen blade. Available in 5 sizes —½", ¾", ⅝", 1", 1⅛". See your dealer or send for free booklet. Absolutely guaranteed!
$4.95 A SET
Dealers, Jobbers, Write for Information!
WARREN DADO SAWING WASHERS CO.
70 Medbury, Dept. 221, Detroit 2, Michigan

CA$H IN YOUR SPARE TIME
BIG MONEY IN OWN BUSINESS
YOU CAN MAKE UP TO $40 A DAY sharpening and setting circular saws for factories, builders, lumber yards — with NEW BELSAW COMPLETE CIRCULAR SAW SHOP, LOW COST. Sharpens 4 to 5 saws per hour, no experience needed, complete instructions. Send today for FREE Catalog.
BELSAW MACHINERY CO
3604 Field Bldg. Kansas City 2, Mo.

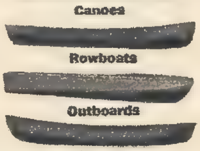

Snap-on Tools
THE CHOICE OF BETTER MECHANICS

4000 fine tools, available direct from factory to user. Send 10c for complete 104 page catalog.
SNAP-ON TOOLS CORP.
8078-A 28th Ave., Kenosha, Wis.

Thompson BEATS the World on BOATS



Better Built
Lower Prices



Safe Boats With Full Length Spray Rails
Keep passengers perfectly dry—even at high speeds. Catalog also shows two new models of "Take-Along" Boats. Two big factories—save you freight.
CATALOG FREE
Write for your copy. State kind of boat in which you are interested.
Light Boat for Auto
THOMPSON BROS. BOAT MFG. CO. (151)
230 Ann St. PESHTIGO, WIS. (Write to either place) 130 Elm St. CORTLAND, N.Y.

Chrysler Station Wagon

[Continued from page 173]

but I feel it could stand a bit more power. For example, on my test I took this car for miles on a run north of Detroit and made a number of acceleration checks just for comparison. I found that, as with so many other automatic boxes, if you want to move out at all you must start in Low and hand shift to Drive as soon as the engine starts to peak. This, incidentally, occurs sooner with this engine than in many others. I found that shifting at about 30 was my best bet. Zero to 60 in Drive all the way, with three people in the car, took 26 seconds. Using Low and Drive dropped the time to 23.8. Zero to 30 in Drive took 8.1 seconds. Using Low it took 6 seconds flat.

SPECIFICATIONS

MODEL TESTED:
1950 Chrysler Town and Country all-steel station wagon

ENGINE:
6 cylinder, L-head; bore 3 7/16 inches, stroke 4½ inches; maximum torque 208 foot pounds @ 1600 rpm; brake horsepower 116 @ 3600 rpm; compression ratio 7 to 1

DIMENSIONS:
Wheelbase 125½ inches; overall length 211 inches; width 75¾ inches; height 67½ inches; weight 4400 pounds; standard tire size 8.20 x 15; gas tank 20 gals.

PERFORMANCE:
0 to 30 mph, 8.1 seconds (using Drive only)
6.0 seconds (using Low and Drive)
0 to 50 mph, 15.3 seconds (using Drive only)
13.5 seconds (using Low and Drive)
0 to 60 mph, 26.0 seconds (using Drive only)
23.8 seconds (using Low and Drive)
Top speed, 82-86 mph

SPEEDOMETER ERROR:
At 60 mph on speedometer, actual speed 61.22 mph

This car cruises nicely at 70 with a top speed between 82 and 86, depending on the load. This is not a race car by any stretch of the imagination and these figures should not be used in comparing this utility wagon against regular sedans of much lighter weight and, by the same token, with far fewer functional qualities. I found in driving the car over narrow and winding roads it handled remarkably well and once when I was forced to turn around on a narrow dead-end stretch down by the lake's edge, I got around with a minimum of effort. Later, much to the horror of the Chrysler man with me, I drove it onto some fairly soft sand and stopped. By slowly giving it the gas in Low, it walked right out without a break. This wagon is big enough to have real traction. The ride is as comfortable as that of any regular sedan in the country and the seats are tops. Chrysler has a way of pitching their seats that some of the other manufacturers would do well to copy. ●

Car Care

[*Continued from page* 140]

thinner. When using such a special thinner, follow the maker's instructions carefully.

Remember that cleanliness is vital to good refinishing. Even finger prints will show up if the unpainted surface is touched by hand. Runs and sags are not desirable either. They can result from too wet coats, too much thinner or too heavy coats. This can be avoided by greater care in regulating the fluid adjustment on the spray gun. Check by occasionally spraying a large piece of cardboard. Don't hold the gun too close to the car.

Your own safety depends on remembering that lacquer is made of dangerous stock. Its chief ingredient, according to a study made by a leading insurance company as a guide to those who spray, is pyroxylin—a direct descendant of nitro-cellulose. It is just a little less combustible than gun cotton. So do the job outside preferably, and make certain there is excellent ventilation with every precaution against fire, if the work is done under cover.

If by this time you haven't recognized the car, we'll let you in on a secret. It is none other than Mimi the Magnificent—a Model A Ford still capable of the grueling grind from Mamaroneck to Jones Beach (38 miles) without a break-down! •

Reducer-Adapter

[*Continued from page* 150]

the camera. The smaller picture opening should be slightly off center. This is to make it easier to operate the 3¼x4¼ holder slides, and to provide operating space for the slotted locking bar at the top of the adapter. The ground glass should be masked with black material so you see the same picture the film records.

To best determine what clearances are required and where each particular piece should be positioned use the holder and camera as patterns. The difference in positions of the film surface in a 4x5 and a 3¼x4¼ is about $\frac{1}{16}$ in. This amount of setback is provided by two thicknesses of velvet and one of tin can material.

The slotted bar used on the adapter is similar to that used on the camera and is attached by means of two screws, bolts or rivets that run through both thicknesses of sheet metal. Ends of the fasteners on the camera side may be secured by light peening or soldering. Paint all surfaces from which light may be reflected with dull black lacquer. Before painting be sure that you have removed all dirt and paste from the soldering. •

GET THE WORLD'S GREATEST
RADIO & TELEVISION
CATALOG! FREE

ALLIED'S
212-PAGE GUIDE
TO EVERYTHING
IN RADIO & TV AT
LOWEST PRICES

Allied Radio
1951

SAVE ON
EVERYTHING
IN RADIO AND TV

Save money on every purchase you make from the world's largest radio supply house! Send for ALLIED's 212-page 1951 Catalog packed with *everything* in Radio and Television. Widest selections of home radios, TV equipment, phono-radios, Amateur equipment, P.A. systems, Hi-Fidelity music systems, recorders, test equipment, builders' kits—plus thousands of parts, tubes, tools, books and diagrams. Get more for your money—send today for your FREE 1951 ALLIED Radio and TV Catalog!

Everything for:
Servicemen
Engineers
Experimenters
Builders
Amateurs

Get Radio's Leading Buying Guide!

ALLIED RADIO

FREE CATALOG

ALLIED RADIO CORP., 6-AA-1,
833 W. Jackson Blvd., Chicago 7, Ill.

☐ Rush FREE 212-Page ALLIED Catalog

Name..................................

Address................................

City................*Zone*....*State*........

DU-FAST OSCILLATING MOTION SANDER

...BEST VALUE BAR NONE!

Where in the world can you get FULL ½" OSCILLATING MOTION . . . LARGE 3-2/3" x 7" FAST-WORKING SURFACE THAT USES INEXPENSIVE STANDARD CUT PAPERS . . . LIGHT WEIGHT FOR EASY CONTINUOUS USE?

Where in the world can you get the economy and convenience of a powerful sander and polisher that attaches in 10 seconds to any Home Utility Black & Decker ¼" Electric Drill? Or (another Du-Fast model) that attaches just as easily to any Skil Home Shop ¼" Electric Drill?

Where can you get the safety that permits you to sand or polish with absolutely no chance of gouging, marring, swirling or burning? YET GIVES A PERFECT FINISH EVERY TIME?

See your nearest hardware dealer carrying either Skil or Black & Decker tools. *ASK TO SEE AND TRY A* DU-FAST *UNIT . . .* YOU'VE GOT A PLEASANT SURPRISE COMING!

DU-FAST OSCILLATING SANDER powered by Home Utility B & D ¼" Electric Drill.

ONLY $14.95 FOR ATTACHMENT!

DU-FAST OSCILLATING SANDER powered by Skil Home Shop ¼" Electric Drill.

ONLY $14.95 FOR ATTACHMENT!

*Pat. Applied For

DU-FAST, INC.

32 East Fourth Street New York 3, N. Y.

1951 BUZZ MASTER

NOTE THIRD WHEEL

8 MODELS — $99 up

More cutting — "Tomorrow's BUZZ MASTER Today!" See the de luxe riding model. Nothing else like it. Made by the oldest firm in the business—now in our 47th year. Many special features used only on Ottawa Saws. Write today for FREE DETAILS.

OTTAWA MFG. CO., 1-187 Brush Ave., OTTAWA, KANS.

NOW SAVE MONEY! FREE Catalog

On MARINE Motors—Supplies Conversion Equipment

REAL BARGAINS—New, Used, Rebuilt marine engines—all makes, types, sizes. All kinds of conversion equipment, fittings, propellers, shafts, hardware, marine supplies also. Buy by mail—SAVE MONEY! Send today for big illustrated FREE Catalog.

STOKES MARINE SUPPLY CO.

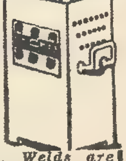
Write DEPT. H • COLDWATER, MICH.

ARC WELDING FOR PROFIT OR PLEASURE

60 LBS. OF READY MADE PARTS Only $24.95

BUILD YOUR OWN HEAVY DUTY WELDER

SAVE BUY ONLY NECESSARY PARTS



All parts Ready-Made and easy to assemble. You can do all around welding on steel, cast iron and other-metals after only a few hours practice. Illustrated instruction manual included. Free plans for building case. Sold on 30 Day Money-Back Guarantee!

FREE: Write today for fully illustrated Pamphlet K-1.

Gives 100% penetration. Welds are stronger than original metal. Operates on 110 or 220 AC.

ATOMIC ARC WELDER CO.

1035 So. 19th St., OMAHA, NEBR.

Hunting In N. Carolina

[*Continued from page* 96]

and forth across a swampy pocket in the valley. Then he decided to stop and fight it out. The dogs set up a frantic din, finally augmented by the high, shrill cry of one hound.

"There's one dog we won't take home," the guide explained. "Hope it wasn't one of mine."

Six of us moved in a semi-circle toward the point where the big Rooshian was at bay, and I, for one, moved very slowly and very carefully. By the time we had approached within 200 yards, however, the chase was on again, but we moved off to see what had happened to the luckless hound. The ground where the boar had paused was torn up in a ten-foot circle and one of the mixed-bred hounds lay dead on the edge of it. Another was whimpering on the edge of a small brook, a ten-inch gash across his side and shoulder. The owner of this hound administered first aid, then set off for camp, carrying the dog.

It was almost two hours later that we caught up with the boar although he had stopped twice to take on his yapping enemies, injuring two more in the process. When we arrived he was at bay in a shallow brook flowing between high cut banks and he ignored the dogs to rush for the guide, the first one to appear. The guide put two heavy 12-gauge slugs through the animal's chest and although one of the slugs tore the heart, the boar ran more than 30 yards straight at the shooter, before collapsing. The guide was reloading while he ran away from the big pig.

When dressed out, the boar weighed 260 pounds and his tusks measured 5½ and 5¼ inches each.

This was considered to be a typical hunt although a boar is not killed every time as we discovered during the next three days. Only one other boar was killed during this period, although four were jumped by the hounds. At the end of four days, only nine of the 16 hounds were in sound condition. Three had been killed and four badly injured. None of the Plott hounds was the worse for wear.

Participation in a Great Smokies boar hunt is neither difficult nor expensive. The State of North Carolina conducts several hunts each fall and winter with the cooperation of the U. S. Forest Service, and Tennessee conducts similar hunts. Experienced guides with the necessary dogs are provided and the cost is $50. Divided among five or six hunters, this charge is negligible. Hunts normally are held between October and January and since the bear season also is open at that time, most of the hunters manage to get either a boar

[*Continued on page* 179]

Alternating Current

[*Continued from page* 156]

AC will do to our newly made magnet. Hook your solenoid up to a toy transformer having about 35 volts output. Pick up some tacks with this homemade magnet and slip it into the solenoid with the tacks still clinging. Allow the alternating current to pass through the coil for about five minutes and then shut it off. Now you will notice that the tacks immediately fall off thus proving the magnetism has been destroyed. (See photos on page 155.) Notice also that the steel is warm.

When you passed DC through the coil a North magnetic pole was set up at one end of the bar and a South pole developed at the other. The tiny magnetic molecules of steel in the bar were all organized into one big magnet. When you passed AC through the coil it set up a North pole at one end but only during one half of the sine wave. When the current reversed, the magnetic poles also had to change. The result is that the molecules are swung back and forth so much that they cannot decide which pole to become. Naturally when molecules are rubbed against each other they will create heat.

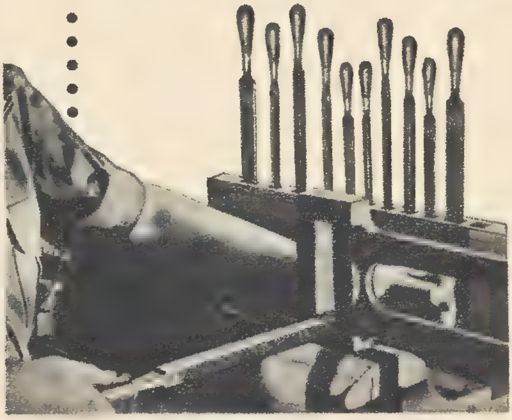
Experiment 5. When alternating current passes through coils of wire other strange things happen. Hook a 6-volt flashlight bulb in series with your solenoid and a 6-volt battery. You will find that although the bulb lights as usual, it might be slightly dimmer owing to the resistance of the wire. Now slip the steel core slowly in and out of the solenoid. The lamp does not change.

Substitute 6 AC volts from your toy transformer and the lamp will light with the same brilliance as with DC. Now slide the steel core into the solenoid and you will find that the lamp slowly dies out! (Second photo.) If this were DC we would say the solenoid is acting as a resistor, but in AC we don't refer to it as resistance. We call it *reactance.* What's more we call it *inductive reactance* because a solenoid with an iron core in it is known as an *inductor.*

Beneath the surface of this experiment some mighty interesting forces are at work. From your practical knowledge of DC you know that when you close the switch in a DC circuit, both the voltage and the current (amperes) jump to the job together. In this simple AC reactive circuit this is no longer true. The minute you close the switch AC voltage appears in the circuit—ready, willing, and able, but the current can't get started. When it finally does get off to a start the voltage has begun to fall and is ready for its reversal. When the voltage goes into its

[*Continued on page* 186]

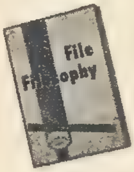
Variety is the spice of filing



A VARIED assortment of Nicholson or Black Diamond files is as much a part of the complete home workshop as a good assortment of bits, taps or chisels. For one thing, it means you always have exactly *The right file for the job.* For example: Mill (single cut) files for sharpening and smoothing. Flat files (double cut) for fast stock removal. X.F. Swiss Pattern files for precision work. Taper files for saw sharpening.

Equally important, Nicholson and Black Diamond quality means top performance. You can't buy files that are more accurately cut, more expertly hardened—more widely accepted by expert filers because of their fast, uniform cutting, and their extra-long life.

Your hardware dealer will be glad to help you work up an assortment of these famous files to fit your needs.



FREE—*"FILE FILOSOPHY"*
—a home-workshop manual on files. Its 48 illustrated pages cover the kinds, care and use of files. Send for your copy today. No obligation.

NICHOLSON U.S.A.

NICHOLSON FILE COMPANY
48 Acorn St., Providence 1, R. I.
(In Canada, Port Hope, Ont.)

BLACK DIAMOND TRADE MARK

NICHOLSON FILES *FOR EVERY PURPOSE*

MAKE *Big* MONEY

SHARPENING LAWN MOWERS

WITH THE

Universal

LAWN MOWER

GRINDER

Enjoy a profitable lawn mower sharpening business of your own. No previous experience needed. Place a hand or power mower on the Universal Grinder. With only **one set-up** you quickly grind the stationary blade and all of the reel blades to proper clearance *without removing a single blade from mower.*

G. Spurlock of Arkansas writes: "I have had my Universal Grinder only 2 months. Live 1½ miles from town. Yet have already made net profit of **$227.00."**

J. L. Peterman of Pa. writes: "Thank you for getting me started in this wonderful business . . . I averaged **$100.00** *a week in May, and made* **$1000.00** *spare time this season."*

TRULY A BIG MONEY MAKING BUSINESS

ROGERS MFG. CO., Dept. L-11, Lindsey, Ohio

SEND THIS COUPON *NOW*

ROGERS MFG. CO., Dept. L-11, Lindsey, Ohio
Please send me full facts about the Universal Lawn Mower Grinder and its big money making opportunities.

NAME ______________________________

ADDRESS ______________________________

CITY ______________________ STATE____________

Build your own *JET ENGINE!*

SEND NO MONEY

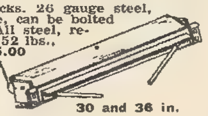
Order these plans today

1. JET PROPELLED BICYCLE. Assemble your own. Photo and instructions $1.00.
2. HOW TO MAKE EXPERIMENTAL JET ENGINES. Seven sheets drawings with information and instructions $2.95.
3. BOTH OF ABOVE in one order $3.75. SEND NO MONEY. Order both at once $3.75 C.O.D. in USA plus c.o.d. postage. Send check or Money Order and we pay postage. Get other information too. Rush Order.

J. HOUSTON MAUPIN, Dept. 88. Tipp City, Ohio

SHEET METAL BRAKES

Forms angles, flanges and Pittsburgh locks. 26 gauge steel, heavier aluminum. Cam locking. Portable, can be bolted to bench, or clamped to edge of truck. All steel, reinforced. Shipped Exp. Coll. 30" size. Wt. 52 lbs., **$26.50.** 36", Wt. 62 lbs. **$31.00.** 48", **$45.00** Floor mountings, portable, 30" high, **$7.00.** 12" BRAKE. Fits in vise to form difficult compound bends, up to 20 gauge steel. Not illustrated **$12.50 PP.** **24" CURVE FORMER,** Capacity—16 gauge steel ____________**$10.00**



IRON BENDER. ¼x2" capacity. 9 parts. All steel ________**$10.00 PP.**

Immediate delivery. Order direct, cash or C.O.D. or send for folder.

VYKE BRAKE CO., X-1116 So. 27th St., Omaha 5, Nebr.

BETTER BOATS FOR LESS

with EXCLUSIVE Ozarka laminated rib construction

This winter, build a boat of your own--a better boat than you can buy for the money. You get complete kit of parts, expertly cut to size, ready for quick assembly. Handy car-top models, snappy run-abouts, resort boats, **$39.60** and up. Only Ozarka gives you all-laminated oak ribs, preformed and mortised, in models of 12 ft. or more. No shrink! No warp! No weakness! Added years of use.

INVESTIGATE THE EASY, LOW-COST Ozarka way before you buy. Send 25c for OZARKA Boat & Accessory Book, to be refunded on first purchase. **OZARKA, Inc., 411 Borden Lane, Woodstock, Ill.**

OZARKA

The Great Joiner

[*Continued from page* 171]

Some nails in the smaller sizes have a duck bill point that cuts through the fibers of the wood similiar to the cutting action of the chisel point. They are used primarily for holding thin veneers.

Nails with side points are used in woods that split easily. They are also suitable for clinching or bending over the point after it has gone completely through the wood. They are similiar to the blunt point but less effort is required in driving.

Everyone has heard of, if not seen, the two-headed man or beast of the side show. The two-headed nail is not a freak but a very useful product of the nail manufacturers that is purposely made that way. It is meant for easy removal from scaffolding or any other temporary work. Other heads may be flat, offset, oval, countersunk, hooked, curved, or checkered. Those to be used for identification purposes have raised or depressed figures. Some nails are even headless.

Much progress, research, and development has gone into producing the high quality nails that are on the market today. Some of these have been made specifically for roofing, concrete work, roller shades, beer cases, baskets, shingles, hinges, and egg cases. Others are for hinges, boats, barrels, berry boxes, flooring, brooms, and fiberboard. Some look and drive like screws, some are barbed, and some have circular rings to aid their holding power. They may be purchased as bright, cement-coated, zinc-coated, blued, galvanized, coppered, tinned, brass plated, or stainless steel. Those that the lathers hold in their mouth while putting up lath are even sterilized.

Nails to be used in roofing are made with a zinc-coated head and a lead plate that seals the hole against possible entrance of moisture. The lead does not cover the head and so cannot be knocked loose by the hammer. To assure an absolutely tight fit, such nails are also available with a shank that resembles a screw.

A comparative newcomer to the nail industry, but one becoming more popular, is the aluminum nail. This nail is especially favored for outdoor work because of its rust-proof, stain-free quality. On a per pound basis it is more economical to buy as the purchaser gets nearly three times as many aluminum nails per pound as he would steel nails. Aluminum nails are now made for roofing, siding, lathing as well as in the common nail sizes in lengths from ⅞ in. to 3½ in. Some styles are made with Neoprene washers to assure a weatherproof seal when they are to be used on outdoor work. •

Hunting In N. Carolina

[Continued from page 176]

or a bear. Under the present regulations, no party may use more than eight hounds, but this is enough for the average hunt.

Supervised boar hunts are conducted also by the North Carolina Conservation Department and interested hunters may obtain complete details by writing to the Department at Raleigh. An applicant must pay a $15 fee and in the event all the permits are taken, this fee is returned.

Any deer rifle is satisfactory although the hunter wants to select the heaviest possible load in the caliber preferred. Many use shotguns and rifled slugs. The range is short and the shocking power of one of these slugs is terrific. If a rifle is used, the sights should be set for 50 yards and the hunter should know the zero of the rifle at any range from 10 to 50 yards. Open iron sights are preferable since you will require sights that will align as quickly as possible.

If you should decide in favor of a shotgun and rifled slug, before you get into boar country touch off a few rounds just to see how your gun shoots. Most novices are inclined to hold much too high.

The boar is not a native of this country, but was imported from eastern Europe about 40 years ago. A mad Englishman, having leased several thousand acres of mountain and forest in the vicinity of Hooper's Bald in the Smokies, had visions of operating a great game preserve. He had big game animals brought from several parts of the world and among them were several Russian boar. This preserve was fenced, at great expense, but when the venture proved a failure, the fence rusted away and the game spread out over the neighboring country.

The boar seemed to find the climate and terrain suitable and they multiplied, spreading out over thousands of acres in the vicinity of the Cherokee and Nantahala National Forests with some in the Great Smoky Mountains National Park and the Chattahoochee National Forest. The average boar weighs from 200 to 300 pounds, but many have been reported scaling as much as 600 pounds. The two large tusks that protrude from the lower jaw often measure seven or eight inches and they are terrible offensive weapons.

While many bear hunters insist that it is a rarity for a bear, except a female with cubs, to charge a man, boar hunters insist that most of these animals will charge a man on sight, even though not wounded. This adds considerable zest to boar hunting, so if you have a yen to hunt really dangerous game, here's your chance. •

The Original Low Cost 8" Tilt/Arbor Saw!

Atlas POWER KING

STILL TODAY'S BEST BUY!

Many have copied it — but no one has successfully included *all* the performance features of this Atlas-Power King at anywhere near the price! Here is just about everything you could want for all your home and furniture construction projects. A saw that speeds your work, keeps it accurate — a saw built to give you a lifetime of good service at low cost. See it at your Atlas-Power King dealers.

Atlas MOULDING and DADO HEAD

Fits any saw with ½" or ⅝" arbor — cuts dados, handles all straight shaping jobs.

Some of the Outstanding Features

★ Tilt/Arbor, Ball Bearing Construction!
★ 2⅝" Depth of Cut — Greatest In Its Class!
★ 11½" Table Surface Ahead of Blade When Cutting 1" Stock!
★ Big Precision-Ground 16" x 20" Grey Iron Table! 34" x 20" With Two Low-Cost Extensions.
★ Quick Positioning Rip Fence — Locks At Both Ends.

FREE Catalog and Shop Hints
Send a Post Card

ATLAS PRESS CO.
130 N. Pitcher St., Kalamazoo, Mich.

MATCHED PRECISION TOOLS FOR METALWORKING AND WOODWORKING

Speed Way
SpeedDrills

Advanced designs, new all-die-cast (aluminum) construction and bigger motors. Lighter, handier, yet faster-drilling than more expensive, more cumbersome old style drills. Drill steel, wood, concrete or stone rapidly and efficiently.

See these new Speed-Drills before you buy; for more drill per dollar and more power per lb.

No. 400 ½″ capacity—more power than drills costing almost double. Jacobs Geared Chuck, removable top handle. $39.50

No. 79 ⅜″ capacity—power of ordinary ½″ drill. $22.50
With Jacobs Geared Chuck $27.50

No. 200 ¼″ capacity. Fast-drilling with added power. $16.50
With Jacobs Geared Chuck. $19.50

Write for Circular on drills, grinders and sander

Speed Way MANUFACTURING CO.
1866 So. 52nd Ave., Cicero 50, Illinois

BOYS-IT'S FREE!

"THE WONDERS OF CHEMISTRY"

This exciting new book shows how to amaze your friends with chemical magic, describes many fascinating home experiments, tells of fun, thrills and big future opportunities for boys who know chemistry. Special atomic energy feature. Send today!

THE PORTER CHEMICAL COMPANY
24 Prospect Avenue Hagerstown, Maryland

THE WONDERS OF CHEMISTRY

Have fun! BUILD YOUR OWN CHAMPION
SPEEDBOAT

Build your own 3 point racing Hydroplane or Runabout! Complete plans available for fastest boats in the world. Send 25c now for new illustrated catalogue to CHAMPION BOATS, P. O. Box 7132 N. Long Beach 7, California

BeMaCo Dependable
AUTOMATIC SAW SET

Sets 400 teeth per minute on hand or band saws 4 to 16 point. Hammer and anvil action sets teeth accurately and uniformly . . . No tooth breakage. Does a perfect job. Used profitably by saw shops everywhere and saw manufacturers. Every machine guaranteed!

FAST - ACCURATE - DEPENDABLE

★INCREASES PROFITS

BEAVER MFG. CO.
SAW MACHINE Div.3C
800 SOUTH ISIS AVE. • INGLEWOOD, CALIF.

Your Invention

[Continued from page 63]

Give a brief outline of any tests which have been made of the invention and include a summary of its patent status and what steps have previously been taken to develop it or bring it to the attention of the armed services or other government agencies. Give a complete description of your invention including any necessary sketches, drawings or photographs. Incomplete information may not be enough to allow the Council to judge the suggestion properly.

Do not send models unless the Council informs you that a working model is needed for testing. In one case an inventor sent the Council a package containing models of two types of bomb. The outside of the package gave no indication of its contents but fortunately there was a warning notice inside. There was considerable alarm until Maj. Gen. W. H. Tschappat, a member of the Council and former chief of Army Ordnance, personally took charge. Another inventor suggested an anti-personnel bomb loaded with itching powder made from a weed and sent samples which almost completely disrupted the workings of the staff.

The Council tries to discourage inventors from going to Washington until the armed forces actually want them there to discuss development and manufacture of their inventions. One inventor made the long trip to Washington from Oregon, only to learn that his invention could not be used by the armed services. He was stranded in Washington without money for return fare.

Because of the official nature of the National Inventors Council and the high standing of its members you can be sure you will not be cheated. However, the highly secret nature of developing inventions for war has occasionally caused misunderstandings. In one case an invention was turned down without explanation only to be used later. The reason was that another inventor had proposed it earlier and consequently had the rights to it. However, the second inventor could not be told this because of security reasons.

Exactly how much the armed services have paid inventors for ideas submitted through the National Inventors Council is not known. However, estimates place this figure in the millions.

Lawrence Langner, secretary of the Council, in speaking of the royalties inventors received from the Government, says, "It's pretty plain that they were all well satisfied. If they hadn't been, they could have filed suit in the Court of Claims and I can't remember a single instance of that having been done."

Certainly Charles A. Hedden has no complaints. Probably as much credit for the Allied victories in North Africa belongs to him as to any other single man. Hedden is no highly trained scientist but rather an ordinary American whose education was received in a country grade school in Florida. In 1934 Hedden, who owned a small radio repair shop, was approached by two strangers who had a map supposedly showing where Gasparilla, the famous pirate, had buried his treasure. They had searched the site near Charlotte Harbor, Fla., but their map had not been accurate enough to locate the exact spot where the treasure lay. Could Hedden figure out a gadget which would show the presence of buried metal?

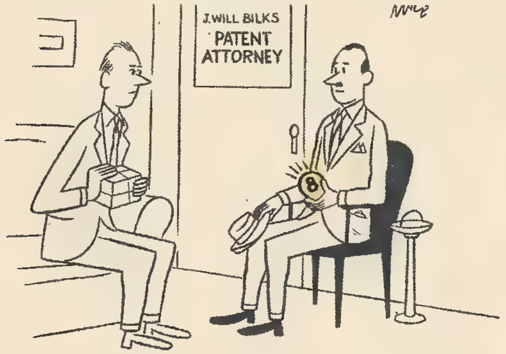
Hedden could and did. He devised a delicately balanced electrical circuit which would be disrupted by the presence of metal nearby. With this contraption the treasure hunters prowled Charlotte Harbor for months. The gadget proved to be a whiz at locating buried metal. It found old anchors, discarded auto crankshafts, rusted stove lids—but no gold.

However, it later proved to be a treasure in itself. For when the war came along, Hedden offered the invention to the U. S. Government through the National Inventors Council and eventually it became the standard mine detector used by the Allied Forces. It played an essential part in clearing out Axis mine fields to open the way for Allied victory.

Hedden received $50,000 from the government for his invention. But he has also adapted it for other purposes such as screening metal out of materials like tobacco and rubber.

But the great success of Hedden's invention has created still another problem—how to detect the non-metallic mines which other nation's have been forced to develop when their metallic models became ineffective.

That problem has not yet been solved and it remains high on the needed list of the National Inventors Council. Solve it—or any other of the difficult military problems listed on page 60—and you'll make yourself a fortune. And at the same time you'll be helping your country in a time of great crisis. •



Buy Starrett THE BEST STEEL TAPES

Standard of Precision

Quick-reading, error-proof tapes made to Starrett standards of accuracy from the finest tape steel. Types, lengths and styles of graduation to suit every need. In both English and Metric. See them at your Starrett Tool Distributors.

No. 530
⅜" tape line with ring, patented hook and folding wind-up handle. 25, 50, 75 and 100 foot lengths. Handsome, extra-durable red artificial leather cover over plated steel case. Popular price.

No. 510
A quality tape with genuine leather covered steel case.

No. 500 Pocket Tapes
3, 5, 6, 8 and 10 foot lengths, nickel plated case, push-button spring wind.

No. 537 Frame Tapes
Ideal for field work. Steel frame, hardwood grip, flush folding wind-up handle.

"Oilgager" Tapes and Bobs
For gaging oils, gasoline, water, etc. Bobs for measuring innage or outage.

Get Your FREE Copy STARRETT TAPE CATALOG
Describes, illustrates and prices the complete line of Starrett Steel Tapes, Plumb Bobs, Levels, Transits and Draftsmen's Tools. Address Department MX

THE L. S. STARRETT CO. • ATHOL, MASS., U. S. A.

Starrett
REG. U. S. PAT. OFF.
Since 1880 . . . Standard of Precision

Mechanics' Hand Measuring Tools and Precision Instruments
Dial Indicators • Steel Tapes • Hacksaws • Band Saws and Band Knives • Precision Ground Flat Stock
Buy Through Your Distributor

Only ¾¢ per mile total operating cost

Easy To Buy!

Easy To Ride!

Easy To Park!

Write for it. New! Rider-Agent Plan

In the language of low-cost transportation CUSHMAN is THE word. It says everything—Low purchase price—low upkeep—very low operating cost—¾ cents per mile! You'll be money ahead and miles ahead to GO CUSHMAN this year. Get the facts now. Write DEPT. 1X at once for FREE illustrated literature.

FREE! Folder Just Out.

DEALER INQUIRIES INVITED

Cushman MOTOR WORKS, INC.
LINCOLN NEBRASKA

SPEED & MILEAGE MANUAL

BUILD 200 M.P.H. STOCKS, HOT RODS, RACERS

Famous Power book shows Souping Methods, Tuning, Track Secrets, Gas Economy, "CALIFORNIA CUSTOM RESTYLING." Covers all makes! Plans for Superchargers, Dual Manifolds, Hi-Compression heads, racing cams, Water Injectors. Get terrific pickup, power, mileage. Complete info, 320 illus!

FREE ➡ "CALIFORNIA HOT ROD HANDBOOK" plus SPEED EQUIPMENT CATALOG given with BIG MANUAL—only 1.98 p.pd. (Racing Catalog without above books 25c)

ALMQUIST Engineering, Dept. 12X, Milford, Pa.

$4.95 REAL ENGINE VALUE

A miniature gas engine that really operates.

Thousands of Buzz "B" gasoline engines have been sold at twice the price. Now is your chance to buy a real ⅙th H.P. gas engine for only $4.95. Turns up over 8,000 rpm. For boats, planes, midget cars, etc. Guaranteed and ready to run. Includes Champion spark plug and tank. Send only $1.00. engine shipped collect for balance, same day. Write for free catalog or

SEND 10C FOR NEW MAMMOTH ILLUSTRATED CATALOG OF THOUSANDS OF HOBBY ITEM

America's Hobby Center, Inc., Dept. A-11, 156 West 22 St., N. Y. 11

WELD BRAZE, SOLDER, and CUT ➡

ONLY $11.95 F.O.B. complete!

EASILY... QUICKLY!

FOUR-WAY WELDER

No experience needed. Follow simple instructions, weld on iron, steel, bronze, brass, aluminum, and other metals. Plugs into any properly wired 110 volt A.C. or D.C. line. Make or save time and money doing repair work for yourself and others. Repair men, farmers, tinsmiths, home and auto owners, hobbyists, etc., say FOUR-WAY pays for itself over and over. Order today or send for Free details.

ORDER NOW 10 DAY TRIAL

FOUR-WAY WELDER COMPANY, Dept. F4-AB
2326 So. Michigan Ave. • Chicago 16, Illinois

Synchronize Camera

[Continued from page 147]

it moves it makes contact which closes the circuit and discharges the flash bulb.

In the case of the box camera, once the front plate has been removed it will be seen that the shutter travels about 180° clockwise when the shutter release is tripped. During this movement a small hole in the shutter passes over the camera lens, allowing light to enter through the lens and expose film inside the camera.

The electric circuit starts with the shutter. A small brass contact point is soldered to the shutter. This makes contact with a sweep contact which in turn is connected to one of the brass plugs which are inserted into the flash case socket. The other brass plug is grounded to the metal frame of the camera to complete the circuit.

Selection of the placing of the shutter contact is the prime problem. It must be affixed to the shutter so that it can travel through its arc without coming into contact with any other moving part. The shutter is cleaned down to the bare metal before soldering to insure good contact, and the piece of brass is bent in the shape of a right angle, with the upright ⅛ in. high. Don't make the base too big for it will add weight to the shutter and slow down its speed.

With shutter contact in place, work shutter slowly and when the hole in the shutter begins to pass over the lens and about ⅛th of the lens surface is exposed, stop the shutter. That is the position that the shutter must be in when the shutter contact is made with the sweep contact. The lens is only partly exposed, but when the slight time lag needed for firing the bulb is allowed, the shutter will be fully open or exposed when the peak amount of light is available.

The sweep contact is a strip of ⅛-in. wide phosphor-bronze, .006 of an inch thick, mounted to the side of a piece of plastic or hard rubber. Two No. 0-80 screws hold it in place. Use No. 53 drill on finger to allow for clearance of screw and use No. 56 drill in making holes in plastic or hard rubber base, for these holes must be tapped so that the finger can be pulled down tightly to the base. This base is then mounted onto the metal plate that holds the shutter mechanism. Use No. 2-56 screws. A No. 44 drill in base will allow clearance, and No. 50 drill in plate will allow for tapping. In locating the position for the sweep contact, place the base so that the finger makes brush contact with the shutter contact when the lens is partly exposed, as outlined in above paragraph. Be careful the screws do not touch each other, for the sweep contact must be completely insulated.

Next come the brass plugs on the face of the camera. It is best to get your flash cord first so that you'll be able to fit the plugs into the socket. Use a piece of plastic or hard rubber as a base for these plugs, and pieces of ⅛th inch round brass plugs. After carefully measuring the distance between the female sockets in your flash cord, drill holes at corresponding distance in your base, using a No. 43 drill, then tap the holes with a No. 4-40 tap. Also drill two holes in the base for screws, No. 2-56's which will secure base to the camera's front plate, using a No. 44 drill in the base.

Using a No. 4-40 die, thread the end of your two plugs. Thread the first plug a turn or two more than the ¼ inch thickness of the plastic or hard rubber base. On the second plug, thread an ⅛ in. or a turn or two more. The longer threaded plug will be your ground. It must reach all the way through the base and come into solid contact with the metal front plate. The plug with the shorter thread is the plug which will be connected to the sweep contact. It must be insulated and therefore must not touch the front plate or it will cause a short.

With the ends of the plugs threaded, leave ⅜ in. of stock above the thread and cut section from rod. Use a hand file, grinding wheel or small lathe to bring the plugs down to a size where they fit snugly into the female sockets of the flash cord plug. The insertable ends of the plugs should be about ¼ in. long, leaving a collar of about ⅛ in. between the thread and the prong.

Locate the area in which you intend to mount the base for your flash contact. Mark out holes for holding screws and also a hole for the connecting wire that will join the sweep contact and the plug. Use No. 50 drill in making the holes for the holding screws, and tap out to fit No. 2-56 screws. The hole for the connecting wire can be made with a No. 43 drill. Mount the base and then screw in the plugs. Make sure that the long threaded plug does bite firmly on the metal front plate and that there is almost an ⅛ in. between the bottom of the other plug and the side of the base that is against the front plate. Put a drop of solder on the end of a piece of insulated wire. Insert into the front plate hole leading into the hole in the base into which the short threaded plug is seated. Hold wire against plug and touch a soldering iron to the tip of the plug until the solder softens and holds. Measure the wire so that there is a bit of slack and join other end to the base of the Finger Spring with a drop of solder. •

Revolutionary New SAFETY Circular Saw Blade

CUT CONTROL
PATENTS PEND

THE PTI SAFETY SAW BLADE

New "Cut-Control" principle practically eliminates all "kick-back" dangers!

The first basic improvement in circular saw blades in years . . . tested and approved by world's leading laboratories . . . now removes most dangers from circular sawing and gives more efficient sawing. Fewer teeth (8 instead of 100), new cutting principle, smooth blade edge between teeth . . . combine to eliminate "kick-back" hazards and minimize extent of finger and hand cuts. Hailed by safety experts as the greatest advance ever made in circular sawing. Ideal for home, school and industrial shops.

Saves power—cuts smoother, cleaner, quieter, too!

This unique new blade lets you slice through the hardest wood with ease . . . and do it with 30% less operating power. Because it has fewer teeth it runs whisper-silent . . . stays sharp longer than ordinary saw blades. Keeps your shop cleaner by producing chips instead of saw dust!

Order this amazing new safety saw blade today!

Here are the prices and sizes, delivered, postpaid.

7" diameter blade....$4.65— 8" diameter blade....$5.35
10" diameter blade....$6.85—12" diameter blade....$8.50

(Add 5% for all shipments West of the Rockies)

In ordering, be sure to give the *diameter* and *bore* of the blade. Send check or money order or we will ship C.O.D. *Money back guarantee,* either way.

PTI Incorporated, **Dept. MI-1**
401 Broadway, New York 13, New York

Gentlemen: Rush me the following units:

Quantity	Blade Diameter	Blade Bore

Please check:
☐ Money order or check for $..........Enclosed. ☐ Send C.O.D.
Name ....
Address..........
City..........Zone..........State..........

NEW MI
BATTERY CHARGER
KITS

DON'T LET COLD WEATHER GET YOUR AUTO BATTERY DOWN!

These NEW Kits will recharge exhausted batteries overnight. They will also operate DC motors, relays, dynamotors, solenoids and government surplus equipment.

TWO BASIC SELENIUM RECTIFIER KITS AVAILABLE

Kit BC1—For charging or operating six volt equipment only . . . $16.95 each—postpaid, continental USA.

Kit BC2—For charging or operating six or twelve volt equipment . . . $22.50 each. Postpaid, continental USA.

Sorry no COD's.

Instructions furnished with both kits. See MI page 136 for additional information.

OPAD — GREEN CO.
71 WARREN ST., NEW YORK 7, N. Y.

ONE-MAN SAWMILL LOW AS...$50.00 DOWN

FREE BOOK

Take BELSAW Portable Sawmill right to the trees—turn out valuable lumber for local yards—do "custom sawing" for neighbors. BELSAW lasts a lifetime. No crew needed. Power with old auto engine. Beginners get excellent results. Send postcard for FREE BOOK, "How To Make Lumber."

BELSAW MACHINERY CO
8344 Field Bldg. Kansas City 2, Mo.

SPECIAL OFFER to Hobbyists ONLY 4.95

Hard Angle Jobs Set-up in 5 Seconds

Save TIME! MONEY! Drill, mill, grind, etc., round, square, irregular pieces at any angle—Quickly—Easily—Accurately with

PALMGREN "HOBB-E" ANGLE VISE
Accurately machined and graduated. 1½" Jaws. 1-Plain, 1-Grooved. Order NOW! Only $4.95. Write for "HOBB-E-TOOL" Circular.

CHICAGO TOOL & ENGINEERING CO.
8349 SOUTH CHICAGO AVE. CHICAGO 17, ILL.

NEW PACKAGED BOATS

17 Models, 8'-16'; Tredronic Racers, Cruisers: Outboard, Inboard. Skiffs. Assembled frames: Tri-Keel construction: Tredronic bottom: Spray Rails: Easy to build!

SEND 25c FOR CATALOG!

Catalog and booklet "Plywood Boats," $1.00

BOAT PATTERNS-BLUE PRINTS

1950 Catalog—100 designs by naval architects. Racing classes, cruisers, inboard, outboard, sail. 6 to 35 ft. Plywood—Steel—Plank. Construction plans, full-size patterns. SEND 35c FOR CATALOG or $1.00 for catalog and booklet on "Boat Building."

MARINE MART-DEPT. 25-BUFFALO 7, N. Y.

MI Battery Charger

[*Continued from page* 136]

if you build the MI Battery Charger and use it properly. Electrically, a charger is a very simple device. It consists essentially of a transformer that steps down the 117-volt house power line to about 15 or 18 volts, and a rectifier that changes this alternating current to direct current. The greater the current that can be pushed into the battery, the shorter the charging time—within certain limitations. A charger that can deliver about ten amperes is just right for batteries now in common use. Left on overnight, say nine or ten hours, it will revive a battery that is pretty well exhausted. Connected for shorter periods at the high rate, or again overnight at a lower rate, it will *keep* a battery peppy.

Easily controllable output is one of the features of the MI Charger. Not only is the primary of the transformer tapped at three points to match the unit to different line voltages, but the direct-current secondary circuit is provided with a rheostat for fine adjustment of the charging rate from the maximum of ten amperes down to about two amperes. Added to this feature is the ability of the charger to handle either six-volt (three-cell) or twelve-volt (six-cell) batteries, either separately or at the same time. While three-cell batteries are standard on passenger cars, six-cell batteries are used on many commercial and on practically all military vehicles, as buyers of surplus Army trucks have found out.

The charger uses a rectifier of the selenium type. This is absolutely quiet in operation, starts instantly, and does not create interference in radio and television receivers. The rheostat and cabinet are not included. The former is readily obtainable from radio supply houses, and the latter is made of plywood.

Neither the placement of the parts nor the size of the cabinet is critical. The transformer and the rectifier, being the heavy items, are placed on the baseboard, and are fastened by 6-32 or 8-32 machine screws and nuts. The meter, line fuse, pilot light, primary switch and output binding posts are on the front panel. Because the unit becomes fairly hot during long charging periods, the rheostat is best mounted outside, where it can get plenty of ventilation. There is no danger of shock from the exposed rheostat as shown. The voltage in this part of the circuit is 18 volts at the very most, and the transformer isolates the house line from the entire secondary.

There's no point in having a charger unless you also have a way of knowing when the battery needs a boost. The ammeter on the dashboard doesn't mean a thing in this respect. The only instrument for the purpose is a hydrometer. The three minutes it takes to check the three cells of a battery may save you from being stuck with an immobile car on a frosty morning.

To put the charger into service, follow this simple routine: first turn off all switches and other controls on the car itself. The only electrical accessory that is permanently in the battery circuit of most cars is the electric clock, and that draws a very small amount of current intermittently. The hood is already up, because you have just made a hydrometer check and the reading isn't as high as you'd like it to be. Place the charger on the engine block or any convenient place near the battery. Make sure the line tap switch is *off*. Plug the power cord into an outlet. Attach the clips directly to the terminals: minus to minus, plus to plus. The pilot light may go on dimly because current flows into the circuit from the battery. Turn the rheostat all the way to the left so that all its resistance is in the circuit. Now turn the line switch to the first *low* position. The first time the charger is turned on the meter may read backward and chatter a bit. If it does, snap the switch on and off once or twice and the needle will read to the right. The current indicated by the meter will be two or three amperes, depending on the line voltage and the condition of the battery.

If you want a heavy charge, turn up the rheostat slowly until the meter reads ten; for a medium charge, back it off to about five amperes. That's all. Close up the garage. The next morning turn the switch off and unhook the clips and the line cord. Don't start the car with the charger connected—the starting motor is practically a dead short circuit and the selenium rectifiers might be damaged.

Of one thing you can be certain: when your neighbors notice how your car kicks over on cold mornings they'll be around very soon to borrow the charger!—*Robert Hertzberg* •

BATTERY CHARGER PARTS LIST

(Kits containing the essential parts for 6-volt chargers or combination 6 and 12-volt chargers may be obtained from
Opad-Green Co., 71 Warren St., N.Y.C. 7.)

Transformer, No. XFC18-14, primary for 117 volts AC; secondary, center-tapped, 18 volts at 14 amperes.
Selenium rectifier, No. B1-10, full-wave bridge type, 10 amperes.
Fuse post and 3-ampere miniature fuse.
Line cord and plug, about 6 ft. long.
Three binding posts.
Four-position tap switch.
Pilot light assembly and bulb.
Ammeter, 0-12 amperes.

Other Required Parts:

Rheostat, 1 ohm, 50-watt rating.
Two battery clips about 3 in. long.
Two knobs, 1/4-in. holes, for rheostat and tap switch.
Plywood for case.

Waxing
Polishing Cars
Sanding
1000 WAYS TO SPEED HOME and FARM JOBS!

Drilling
Wood Boring
Wire Brushing

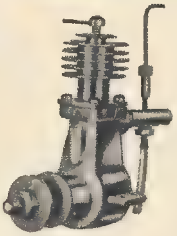
HOME-UTILITY
5" ELECTRIC
SANDER-POLISHER
only $32.95 (complete)

There's almost no end to the jobs you can do with a Home-Utility Sander - Polisher! It comes *complete* with sanding discs, lambswool bonnet, 1/4" drill chuck, cans of polish and wax. It drives many other inexpensive attachments for grinding, sharpening, buffing, burnishing, cleaning. It has an extra-powerful motor for high-speed work from AC or DC outlet. It weighs only 3½ lbs., easy for the whole family to use. And it's quality-built by BLACK & DECKER, world's largest portable electric tool maker. Try it at your hardware, electrical appliance or implement dealer's or department store.

Products of HOME-UTILITY Div.,
The BLACK & DECKER Mfg. Co.,
Dept. H1X, Towson 4, Md.

ELECTRIC HOME-UTILITY TOOLS

1/4" DRILLS and 1/2" DRILLS • TOOL KITS
LECTRO-SAWS • BENCH GRINDERS



OUR 338TH ADVERTISEMENT
REAL DIESEL ENGINE!

$2.95 YOU CAN'T BEAT THIS PRICE!

- Ideal for planes, boats, midget cars
- Actually runs at 7500 RPM, produces 1/7 HP
- Height a full 3½ inches; weight 5 ounces.
- Comes to you completely assembled, ready for operation

MAYBE WE'RE CRAZY, giving away a precision diesel engine, complete with cylinder and piston, carburetor, crankshaft, connecting rod, etc. for ONLY $2.95. But we're selling thousands of DEEZILS all over the world, and that keeps our costs down. DEEZIL is streamlined, compact, rugged. Starts quickly, easy to install, runs for years! Fast delivery if you ORDER DEEZIL TODAY!

SEND $2.95 PLUS 25c POSTAGE.

GOTHAM HOBBY CORP., Dept. M, 107 E. 126th St., N. Y. 35, N. Y.

EVERY ELECTRIC DRILL
A PORTABLE SAW
9.95 with 4" "HYCARBON" Crosscut Blade
At Better Hardware Stores Everywhere
Can Be Used With One Hand!
Any 1/4" or 3/8" Drill a Powerful Saw in ONE MINUTE
"ARCO-SAW" is a rugged tool with right angle gear drive (no clumsy, dangerous, direct drive with drill sideways). Works like a high priced Portable Saw.
CUTS 1-5/16", or 2x4 by turning over
ONLY ARCO GIVES YOU ALL THESE FEATURES: Safety-yoke assures rigid connection and absolute safety—Big handle affords firm grip for two-hand operation—Precision one-piece gear box—Self-lubricating life-time bearing—Visual guide and wide shoe-plate for straight, square cuts—Lowest priced, quality Replacement Blades.
"HYCARBON" 4" Crosscut or 4" Combination Blade ...$1.60 ea.
90-day Factory Guarantee
ARCO
Pat. Pend.
'ARCO SAW'
NOW! EVERY "ARCO-SAW" AN
ANGLE SANDER & POLISHER
Your "ARCO-SAW" becomes a powerful right angle sander & polisher in just a few minutes. Ideal for removing paint from cars & walls, simonizing cars, polishing linoleum & furniture. Swivel action between drill chuck & gear box permits new freedom of use at any angle on every surface, or when necessary safety-yoke can be used to hold unit rigid. No need to buy an expensive special angle gear drive. New ARCO "SAND-'N-POLISH" Attachment consists of flexible molded rubber head, sanding disc, lambswool polisher, bottom plate, hexagon adaptor, & also 1/4" adaptor for use in drill chuck. 1.95
ORDER TODAY at your dealer or send us check or M.O. (Postpaid) C.O.D.'s—Postage extra.
UNCONDITIONAL 10-DAY MONEY-BACK GUARANTEE
DEALERS—Write for nearest jobber.
ARROW METAL PRODUCTS CO.
DEPT. MI-1, 140 WEST BROADWAY, NEW YORK 13, N. Y.

KING MIDGET Home Assembled Auto
WORLD'S LOWEST PRICED CAR!
Drive this car for as low as 50c per week. Precision built parts direct from factory with beautiful all steel body. Get the facts on this amazing small auto—send 25c for detailed circular with large picture, 4 view drawings and price of all parts, or send $1 (refunded first order) for this plus actual assembly book with 42 photos, drawings; blueprints of snow, ice conversions. Ideal for micro-midget racing—get this information.
MIDGET MOTORS MFG. CO.
ATHENS 3, OHIO

Can You Equal This Home for $2915
Shipped Direct from Our Mill
Save 30% to 40% on Your New Home..
Act Now!
Don't pay several hundred dollars more than necessary when you build a home! Buy direct from our mill at our low factory price. We ship you the lumber cut-to-fit, ready to erect. Paint, glass, hardware, nails, etc., all included in the price—no extra charges. Plans furnished—also complete building instructions. No wonder our customers write us that we saved them 30% to 40%. Easy terms—monthly payments.
BIG BOOK of House Plans in Colors 25¢
Handsome Big CATALOGUE
Pictures wonderful homes in colors at money-saving prices. Designs to suit everyone. Send 25c for catalogue today.
LEWIS MANUFACTURING CO.
6811 Lafayette Ave., Bay City, Mich.

Alternating Current

[*Continued from page* 177]

reversal the slow-starting current is late again in moving in the opposite direction. We call this *leading voltage and lagging current* and we always have it when an inductance is placed in an AC circuit.

Experiment 6. Hook up an 8-mfd paper condenser with a 6-volt flashlight bulb and your solenoid as illustrated in fig. 3. You will notice that with the core out of the solenoid the flashlight bulb burns very dimly. If we add more inductive reactance we will cancel out some of the capacitive reactance and then the circuit will approach resonance. We can do this by slowly sliding the core inside the solenoid. At once the bulb begins to burn brighter proving that more current is flowing, and showing that we are knocking down the capacitive reactance. You will find that as you approach perfect resonance the bulb may burn out.

Your radio receiver owes it ability to separate the stations to resonant AC circuits. As you turn the tuning dial you are adjusting your variable condensers so that they resonate with fixed inductances in the receiver.

Experiment 7. Wind about 20 ft. of No. 28 double cotton-coated wire on top of the winding already on your solenoid. This now becomes the secondary winding. The primary winding is the original wire on the coil (see fig. 4). Notice that there is no connection between the coils. For this experiment the iron core should be placed in the coil.

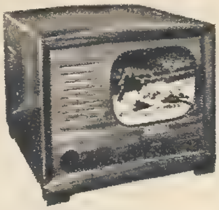
The experimental transformer should be tried on DC first—about 45 volts. When DC is passed through the primary you will find that nothing appears to happen at the secondary end. The fact is when you first sent the DC through the coil there was a surge of voltage in the secondary caused by the build up of a magnetic field in the coils. However, to make the transformer work we need more than a momentary magnetic field surge. We need a continuously rising and falling magnetic field. The answer to the problem is to use alternating current.

Disconnect the DC battery source and connect the primary winding to a 35 volt tap-off from your toy transformer. Now you will notice that the flashlight bulb lights—and stays lit! The rising and falling magnetic field caused by the alternating current in the primary winding is inducing voltage in the secondary coil. In this case your transformer is operating "step down," that is, it is reducing the 35-volt input to 2 volts.

By going through these experiments, you will be able to clarify many of the seemingly inexplicable properties of electricity. •

BUILD YOUR OWN TELEVISION SET

Only $49.95
Basic Kit



It's Easy! You don't have to know radio to build this fine Telekit. All you need is a soldering iron, pliers and screw driver. Photos and diagrams in new 54 page illustrated instruction book show you each step of the way.

Over 30,000 Telekits have been assembled. Pictures are bright and clear. Superior to sets costing much more.

Write today for complete information. Free literature explains how you can build your own TV set, and has complete prices for kits, antennas, boosters, and TV accessories.

GUARANTEED. Unusual factory service plan GUARANTEES GOOD PERFORMANCE. Write for FREE booklet with complete details.

ELECTRO-TECHNICAL INDUSTRIES
1432 N. BROAD ST. DEPT. A PHILA. 28, PA.

FINE TOOLS *NEED* FINE OIL!

- Lubricates
- Prevents Rust
- Cleans
- Polishes

SOLD EVERYWHERE

3-IN-ONE *Oil*

NEW

7 x 50
$36*
leather case included

30 DAY FREE TRIAL

7 x 50 *Prism* BINOCULARS

Finest Precision Optics
Lightweight Aluminum Bodies
Money Back Guarantee

Many other models
AS LOW AS $6.00*
(*plus 20% fed. tax)

FREE Catalog & Book
"How to Select Binoculars"

Dealer Inquiries Invited

BUSHNELL Binoculars 43 E. Green St. Dept. MX-1
Pasadena 1, California

NEW 1951 MODELS!

CROSLEY

New for 1951—Crosley, the most *improved* car. Bigger, sturdier, heavier. You have to drive a '51 Crosley to know the car as it is today. Powerful engine with 7.8:1 compression ratio, hundreds of mechanical improvements. New interior and exterior features and styling. Economy, too. Crosley gives you 35 to 50 miles on a gallon of regular gasoline. *And Crosley is still the only car you can buy for less than $1,000.* Lowest price, lowest down-payment, lower monthly terms. So test *drive* the new 1951 Crosley—you'll be thrillingly surprised!

SUPER MODELS have roll-down windows, fold-up rear seats, major upholstery improvements including full inner lining and door trim. Super Sports has big, solid, hinged doors, folding top, zipper side curtains.

ALL MODELS, Super and Standard, now equipped with Bendix 9 in. hydraulic brakes, hydraulic shock absorbers, heavy duty front axle, larger clutch, cast iron block engine, turn indicators, mechanical link clutch release mechanism, exhaust valve rotators, full flow oil filter and hundreds of other improvements. Radically new front design combined with late body restyling.

Super Station Wagon

Super Sports

Super Sedan

Standard
Business Coupe

Super Convertible

Panel Delivery

CROSLEY
a FINE car

"You see them everywhere"

FREE! 1951 Crosley Catalog! Write Crosley Motors, Inc., 2530-NZ Spring Grove Ave., Cincinnati 14, Ohio.

SPEED AND POWER Handbook

Photos
Drawings
128
ENAMELED
PAGES

50 CHAPTER LIBRARY EDITION

Build Fast Stock Cars! California Roadsters! 160 MPH Rods! Covers Crosleys to Cadillacs—all makes—Authentic—Direct from California!

Tens of thousands have been sold!

SAVE SAVE SAVE

Build your own Dual Manifolds! Superchargers! Hot Cams! Water Injectors! Hi-Compression Heads! Mileage Devices! Get up to ten more miles per gallon! Get racing speed, lightning acceleration, dynamic power increases from any make passenger automobile! Get construction drawings! Tuning techniques! Speed tricks! Economy secrets! Ingenious formulas! Covers "Racing Frames"—"Reciprocating Masses"—"Jet Engines"—"Wheel Geometry"—"Dynamometers"—Dual Pipes, Gears, Fuels, Porting, Relieving, Lowering! Balancing—5C breathtaking chapters!

Includes **"CALIFORNIA CUSTOMIZING"**—Diagrams! Newest Ideas! Restyling all makes! Plus **1951 Racing Catalogue.** Plus big "Economy Manual" and "Alcohol Injection."

SPEED SHOP
METHODS
300
ILLUSTRATIONS

5 ITEMS Postpaid $1.98

NEWHOUSE AUTOMOTIVE INDUSTRIES
5805 EAST BEVERLY BLVD. DEPT. C4
LOS ANGELES 22, CALIF.

Get Into the BIG PAY Welding Jobs

WELDS anywhere! Earns MORE PROFIT!

Cash in on big paying repair and emergency service jobs with this Gas Drive Combination A.C. Welder and A.C. Power Unit. It's actually two machines in one. Lets you make arc welded repairs or flip a switch and operate A.C. lights, tools, motors, etc. Makes you independent of power lines and brings you extra money on emergency break down jobs. Find out how easy it is to own one of these profitable 2 in 1 units. Write today for details and free catalog. HOBART BROTHERS COMPANY, BOX SM-111 TROY, OHIO.

HOBART *"One of the world's largest builders of arc welders"*

5 BIG POWER TOOLS in ONE
8" TILTING TABLE SAW
30" LATHE
SANDER
VERTICAL AND HORIZONTAL DRILL PRESS
GRINDER

RETAIL PRICE $125.00
FACTORY TO YOU $59.95

SUPERSHOP the PRECISION BUILT WORKSHOP. Lifetime lubricated BALL BEARINGS. All running parts precision GROUND. Compare finest production tools. BIG capacity. Amazing VALUE. Write for FREE catalog, full details, trial plan.

POWER TOOLS, INC.
619 Yates Ave.
Beloit, Wisconsin

Thousands in Use
ECONOMY TRACTOR

SMALL! POWERFUL!

America's finest low cost tractor. Ruggedly built. Easy to operate. No belts, no chains. Borg-Warner clutch, trans. and diff. 140 to 1 reduction. 40% more drawbar pull than ordinary tractors. 8-1/4 H.P. engine--gasoline or kerosene. 20 quick change implements.
Write for complete details.
ENGINEERING PRODUCTS CO.
910 Niagara Ct. Waukesha, Wis.

MAGNETS LIFT 125-lb.

AMAZING PERMANENT MAGNETS—WILL NOT WEAKEN! NON-ELECTRIC. Retrieve guns, tackle, tools and other steel items from lake, river, plating tanks, drains or other hard-to-reach spots. Recover drills, taps, etc. from floor sweepings. Clear alley of harmful tacks, nails. Many other uses listed. Pays for itself quickly. GUARANTEED: Try any magnet one week. Money refunded if you are not well-pleased!
Cat. #M430 (Has a pull of 125 lbs. on a flat steel block)________$7.50
Cat. #M410 (40 lb. pull)___$2.50 Cat. #M528 (10 lb. pull)___$1.00
Cat. #M500___Hobbyist's assortment of seven small magnets___$1.10
RONALD EYRICH, 2566 N. 49th St., MILWAUKEE 10, WIS.

STANDARD GARDEN AND SMALL FARM TRACTORS

Plow
Seed
Cultivate
Mow Hay
and Lawns

Powerful Gas Tractors for Small Farms, Gardeners, Florists, Poultrymen, Fruit Growers, Suburbanites.
1 & 2 Cylinders
High Wheels. Rubber or Steel Tires. Walk or Ride.
Easy Terms — Free Catalog
STANDARD ENGINE CO.
MINNEAPOLIS, MINN.
4023 Como Avenue
NEW YORK, N. Y.
629 West 26th Street

WORLD'S FINEST MODEL AIRCRAFT
THEY'RE FLIGHT-ENGINEERED BY EXPERTS!

30"-ERCOUPE $1.25
24" CORSAIR $1.00
"INTERPLANETARY SAUCER" 39¢ kit contains two
$7.50 Giant 76" SEDAN
30" PIPER CUB $1.00
36" BLACK WIDOW $2.25
PLAYBOY C. Sr. 70" $6.00
23½" HAWK P6E $3.00
30" VOYAGER $1.25
36" LIGHTNING $2.25
NEW CONDOR $1.00
LANCER 32" 75¢
30" AERONCA $1.00
30" PANTHER $1.50
TOPPER II (A & B) 16" 98¢
19" SPAD $1.75

MIN. ORDER $1 • ADD 25¢ PACK-POST • CATALOG 10¢
CLEVELAND MODEL 4507A24 Lorain Ave. Cleveland, Ohio

Make-It-Yourself

[Continued from page 72]

him happy. That year the man made himself happy to the tune of $20,000 which is what he grossed by taking on those two-by-nothing jobs that commercial machine shops wouldn't touch. Now he spends all his time at Zelf's.

Most of Zelf's customers are men, but an exception was a young lady who dropped in last year just to learn. Now her business is making plastic dolls for window displays.

Zelf worked for seven years in the Aluminum Company of America's plant in New Jersey. Before that he worked on the first PT boats to see action in World War II. After the war he had some ideas of his own that he thought might make him some money if he could develop them.

Wherever he went his requests to "borrow" machine time for experimental work were turned down flatly. He wondered, "If I can't find a place to work out my ideas, aren't there many more like me? If I opened a shop for experimental work, wouldn't expert machinists beat a path to my door to rent the machines?" He did, and they did, and Zelf was in business.

One of his first clients—he doesn't like to call them customers—was a famous New York sculptress, Roxana. She had always had an ambition to design a modern, all-metal lamp. Expert department store buyers told her that her ideas were interesting but first they wanted to see a working model. Then she went to Zelf's, completed her model in three months and got a fat check for the design from the first manufacturer who saw it. Today, the artist-sculptress-machinist is one of Zelf's regular customers.

Zelf is an unusual businessman. He runs the shop himself, has no employees and works an average of 15 hours a day, six days a week. But since many of his clients are hobbyists who like to work after office hours and on days off, Zelf's shop frequently is open 24 hours a day, seven days a week. He turns his key over to anyone who wants to work on Sundays, holidays or during the night. He trusts everyone and his trust has never been betrayed.

"And why not?" he asks, smiling. "Everyone who comes in here does so because he is in love with his hobby and he knows that this is the only place in New York where he can rent a machine and do what he pleases. He not only sees that nothing is stolen, but he takes care of the place as if it were his own home."

Two of Zelf's clients have practically made his shop their headquarters. They have installed telephones, with Zelf's blessings, and have set up a little desk in a corner from which they solicit work. Zelf charges them nothing more than the rental fee for the machines they use. He keeps no time slips or records. All his clients keep their own records and pay accordingly. Experts and amateurs, all pay the same fee, which averages four dollars an evening.

Zelf's biggest thrill came recently when he saw one of his clients complete the working model of a fascinating invention. The man was a British engineer and he called his device a "differential gravity meter." An extremely sensitive instrument, it was originally designed to work as an altimeter, to tell the distance away from the earth's crust without depending on atmospheric pressure, sounding devices or radar. Although its details are secret, it was based on a magnetic balancing mechanism. The Englishman sold his model to a prominent company for $50,000 cash.

Though quite a few have been able to carve themselves a substantial reward with the aid of Zelf's clubhouse machine shop, many come just to work on their favorite hobbies. One young man from a wealthy family in Scotland came to New York as a seaman on a merchant ship and happened to meet Zelf Dugal. He said it was his boyhood ambition to build a model "pug" engine, like the kind that run in Scotland. Zelf invited him in and he finished his model. He fell in love with machines and instead of going back to Scotland took a job as a machinist in a Massachusetts plant.

Even major companies have taken advantage of Zelf's unusual setup. One national food-processing company sent an engineer over to try to develop new packing machines. After working more than a year at Zelf's, he built a machine so big they had to take it apart again to get it out. The presence of such trained men in Zelf's shop is of great value to beginners and hobbyists who often get expert advice and aid from them.

Since he has opened his shop, Zelf says he has learned that there is a gap between the engineer and the craftsman. "One gets too much paper work and not enough practice at a machine. The other gets too much practical work and not enough study or theory."

"I hope," Zelf adds earnestly, "that my shop someday will serve to bridge that gap. I would like to see engineers and craftsmen together. It does everybody a lot of good."

That's just one of Zelf's theories. Right now his biggest problem is to make his shop even larger and to add more machines. He wants to build small rooms and equip them for individual work, with small tools and drafting tables. Then, to help his clients even more, he hopes soon to be able to hire a professional machinist, engineer and draftsman to help him "dish out" advice. •

HANDEE
tool of 1001 Uses

FINEST IN POWER TOOLS
PLUS 51 ACCESSORIES

Complete . . . designed for every hobbyist and mechanic! Grind, drill, polish, carve, sand, saw, etc. Packs plenty of power in the 25,000 r.p.m. motor, with approved 7-segment commutator. Handsome fitted steel carrying case.

Complete, with liberal 10-day money back trial offer....... $27.50
with 7 accessories... $19.95

HANDEE WORKSHOP
"Tornado-Powered"
with NEW HANDEE "85"

Versatile, with 41 accessories . . . suitable for shop or home use. For novice or expert . . . precision routing, molding cuts. HANDEE "85" a production wizard . . . automatically air-cooled, pin-point accuracy. Sensational power!

Complete, packed in handsome case, $29.95

FREE! New 64-page Manual

Chicago Wheel & Mfg. Co., Dept. MI
1101 West Monroe St. Chicago 7, Ill.

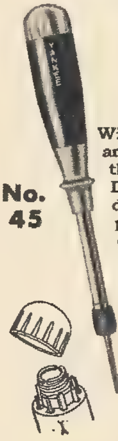
A New . . . and Better Push Drill by "YANKEE"

No. 45

With a handle that fits your hand and a flange to rest your thumb, the ALL-NEW "Yankee" Push Drill No. 45 makes quick work of drilling small holes . . . in wood or plastics. Magazine handle holds 8 drill points (1/16" to 11/64"). Improved chuck . . . drills can't pull out. Automatic return action clears chips. Buy it from Hardware Dealers and Industrial Supply Houses everywhere. Send for booklet "How 'Yankee' Tools Make Good Mechanics Better" FREE. North Bros. Mfg. Co., 221 West Lehigh Ave., Philadelphia 33, Pa.

"YANKEE" TOOLS NOW PART OF STANLEY THE TOOL BOX OF THE WORLD

NORTH BROS. MFG. CO., Philadelphia 33, Pa.



He's A Plastic Baker

[*Continued from page* 79]

a lucky coin or even a gold-filled tooth from the mouth of a dear-departed husband.

But "Smilite," as Smilie dubbed his new plastic, was too good to be confined to tiny buttons and pins and soon he gave up the button business in favor of larger and more decorative items. His big break finally came in the form of an order from a Hollywood restaurant for a plastic mural measuring 18 feet wide by 6½ feet high. Could he produce it?

Smilie was sure he could, but not in his family oven. Scraping together all their assets and capital, the Smilies moved to Los Angeles, leased an entire building with overhead living quarters, bought a huge electric bakery oven, built some large 3-by-6½-foot sheet metal molds and went to work. They had just enough raw plastic to do the job and could get no more with which to experiment. It had to be right the first time—or else. Of course, it turned out to be right.

Since then, Smilie has been turning out plastic murals and decorative items for which he is paid fabulous prices. The adaptability of his secret plastic lends itself to all forms of artistic expression. Unlike laminated plastic wherein a fabric or flat object is sealed under pressure and heat between two sheets of smooth clear plastic, Smilite is molded from the raw crystaline or powdered state, being heated and melted around objects in an open pan-type mold. The result is a plastic sheet with a soft, wavy surface filled with thousands of tiny bubbles containing the design or objects encased in it. Another advantage over the laminated plastic is the fact that after coming out of the oven, Smilite can be reheated and shaped into any desired form. With laminated plastic, the fabric or materials sealed within would tend to break or tear if the plastic were reheated and bent.

When Smilie is not making plastic murals, he's busy turning out gift items such as salad and fruit bowls, serving trays, plates, lamp shades, screens, light shields, coffee tables with Smilite tops and Smilite masterpieces for furniture panels. His bowls retail for from $3 to $165. A 12-inch plate retails for $7.50. Screens sell for as high as $750 and for murals the sky's the limit, depending on the size and work involved. Smilie has received as much as $2,500 for a single job.

On a typical day off, the Smilies can usually be found roaming the countryside collecting specimens of geological beauty or chasing some rare butterfly through the fields. Smilie insists that as long as nature sticks to its policy of never duplicating itself, he'll never turn out two identical pieces of plastic art. •

Meet Mr. Typewriter

[*Continued from page* 76]

excitement was over, Tytell had a tough job explaining to his neighbors.

On the other hand, it's the ordinary working American who provides Tytell with some of his most amusing experiences. There was the time a middle-aged man came in and asked for a typewriter with nothing but question marks on the keyboard. He wanted them to come out above and below the line and in different sizes. "I did the job for him," Tytell says, "but I could never find out what he wanted it for."

Probably the most interesting part of Tytell's work is that many of his customers come in without knowing how to speak a word of English. "Then we carry on our transactions in sign language," Tytell says. "I can show them samples from more than 2,000,000 type faces that took me nearly 20 years to collect.

"But once a Catholic priest came in. He couldn't speak English so he tried me in Polish. I tried him in German. Then he tried me in Russian. We couldn't get together. Just as I was about to take him to my type files, he asked me if I could speak Hebrew. It turned out that priest spoke perfect Hebrew."

Tytell takes a keen interest in the problems of disabled veterans and physically handicapped people. Together with Prof. August Dvorak, of the University of Washington, one of the world's greatest authorities on time studies, motion analysis and aptitude testing, Tytell has designed his famous typewriter for one-armed persons.

Right now Tytell is busy putting the final business touches to a dream that has held his attention ever since he's been in the business. He calls it "The Typewriter of Tomorrow."

It took him eight years of laborious research to develop. Although most of its parts are in the process of being patented and are still secret, Tytell is willing to divulge two revolutionary features. One is based on the principle of a self-generating flashlight. Every time the carriage on his dream typewriter moves back and forth, it builds up juice for tiny batteries that provide the typewriter with its own built-in source of illumination. A second feature enables the typist to adjust keyboard pressure for either side of the typewriter so that a left-handed typist, for example, can fix the keys to take the extra pressure of his left hand.

If you're ever shopping for a typewriter around Fulton Street in New York and a salesman asks you if you want to buy the dream machine of tomorrow—don't laugh! It'll probably be Mr. Typewriter himself. •

—*Harry Kursh*

THE BIGGEST
VALUE
ON THE MARKET
DIRECT FACTORY TO YOU

DYNAMIC Super Charged ARC-WELDER

LOWEST PRICED TRANSFORMER TYPE INDUSTRIAL WELDER

DOES WELDING, BRAZING, SOLDERING, CUTTING

This is one of the finest scientifically designed and precision-built genuine heavy duty transformer-welders on the market today! Made by an old established firm. High efficiency, heavy-duty output does work you'd expect from costlier machines. It's EASY TO OPERATE. Do expert work in a jiffy by following the simplified instructions furnished. Works on iron, steel, brass, bronze, aluminum or other metals. OPERATES from any convenient properly wired 110 VOLT A. C. line. SAVE TIME AND MONEY . . . build or repair your own auto, home, farm, or shop equipment and appliances, etc. Make big money doing work for others in spare or full time. OVER 50,000 SATISFIED USERS all over the country, hobbyists, maintenance and repair men, farmers, tinsmiths, engineers, home and auto owners. Send coupon today for full details on 10-day trial.

VALUABLE ATTACHMENTS included as gift for prompt action!
Write for free details

DYNAMIC WELDER CO., Dept. D4-AB6 15 E. 23rd St., Chicago 16, Ill.

DYNAMIC WELDER
FLUX

SEND TODAY FOR FREE DETAILS

Please send complete descriptive Dynamic Welder literature and details on 10 day Money back trial and gift offer.

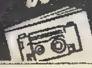
Name. . . . .
Address. . . . .
City. . . . . *State*. . . . .

FREE Bargain Book

Packed with hundreds of sensational bargains—new and used—in still and movie photo equipment and accessories. Write for your free copy today to

Central Camera Co.
Dept. 12A, 230 S. Wabash, Chicago 4, Ill.

Photographic Headquarters Since 1899



M.I.

New WOOD SAMPLE KIT

Only $8.50

The only wood study kit on the market. Contains 54 wood and wood products specimens size 3/8"x 2 1/4"x5", an 84-page identifying manual with 51 magnified cross sections; a 10-power hand lens and knife. Send this ad and only $8.50 today for delivery any place in continental U. S.

TIMBER ENGINEERING COMPANY
1319 18th ST., N. W., WASHINGTON 6, D. C.

TRY WATER-INJECTION 30 DAYS AT OUR RISK!

Add zip to your car with "Vapo-Jet." Automatically combines water, oil vapors, with fuel, to help give smoother performance, more power, faster get-away, better pick-up, fuel economy.

LIMITED SUPPLY. Rush order today! Give car make, model, no. of cyl. Remittance with order saves postage!

ONLY $9.95 Post Paid

BANTEL MFG. CO., 13610D S. Central Ave., Los Angeles 59, Calif.

NEW! 15" ALUMINUM "DRIL-PLANE"

Now you can joint, edge-plane, cut mouldings, rabbet, groove, chamfer, and bevel by simply connecting your 1/4" electric drill, flexible shaft, portable saw or a used vacuum cleaner motor to this versatile machine. ORDER TODAY! $12.95. 1 11/16" wide planer cutter $2.50 extra. Send for illustrated folder. JAR-NU INDUSTRIES, Box 415 Springfield, Ill.

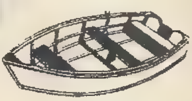
Easy To Build

U-MAK-IT BOAT KITS

8 FT PRAMS
ROWBOATS

OUTBOARDS

INBOARDS &
CRUISERS



BUILD THE BEST
U-MAK-IT KITS

SEND 25c (coin)
NEW CATALOG
ORDER YOURS TODAY

U-MAK-IT PRODUCTS 703A-WHITTIER ST.
New York 59, N. Y.

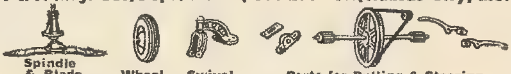
New POWER MOWER

Build It Yourself And Save. Amazing new invention makes whirl-blade mower pull and steer itself as well as cut grass and weeds. Build it yourself. Send name and address on 1c postcard for FREE building instructions . . . NO OBLIGATION.

PULLS ITSELF, STEERS ITSELF

FREE Building Instructions

T & H Mfg. Co., Dept. MIC-1, 811 E. 31 St., Kansas City, Mo.



All Parts Available Complete Kit or Separately.

Big 584 Page Catalog of 7500 Novelties, Gadgets, Tricks, Jokers, Hobbies, Fun-Makers, Etc. Only 10c

Collier's, Coronet, New Yorker, Tide Magazine Write About This Amazing "World's Most Unusual" Catalog

More interesting than carnival, circus, world's fair & science exhibit rolled into one. Odd hard-to-get novelties, gadgets, funmakers from all over world. More fun than reading best selling book. Costs us nearly $1.00 a copy. You send only 10c for this big 600 page catalog—nothing more to pay or buy. Partial contents:

Accordions
Adders
Airplane Models
Air Rifles, Pistols
Albums
Alligators
Altars
Animals, Live
Archery
Artist Supplies
Ash Trays
Astrology
Astronomy
Atomic Science
Auto Items
Awards
Awls
Axes
Badges
Balloons
Banks
Bar Novelties
Barometers
Baseball Items
Basketball Items
Bead Looms
Beards
Beer Novelties
Belts
Betting
Bibles
Bicycle Supplies
Billfolds
Binoculars
Blankets
Boats
Bodies, Shrunken
1000 Books
Boxing
Bracelets
Bug Killers
Bugles
Buyers' Guide
Calculators
Calls, Animal
Cameras
Campers' Items
Caps, Guns
Card Tricks
Cartoonist Items
Cash Boxes
Chameleon, Live
Charms
Chemistry Items
Chess
Chimes
Cigar & Cigaret Novelties
Clairvoyance
Clocks, Watches
Code Maker
Coin Items
Compasses
Contest Winning
Cosmetics
Cowboy Items
Crosses
Crucifixes
Crystal Gazing
Crystal Radios
Cuckoo Clocks
Dancing
Dice Items
Disguises
Dog Novelties
Drawing Items
Electric Eye
Electrical Goods
Electro-Platers
Emblems
Engines
Engraving Tools
Enlargers
Exercisers
Exploding Items
Fencing Items
Field Glasses
Fishing Items
Flowers, Seeds
Flying
Football
Forecasters
Formulas
Fortune Tellers
Fun Makers
Gadgets
Games, Supplies
Garden Items
Geiger Counter
Girls, Pretty
Glasses
Golf Items
Guitars
Guns, Supplies
Gymnastic Items
Handicraft Items
Hardware
Harmonicas
Head, Shrunken
Height Builders
Hobbies
Home Exper.
Home Repair
Horse Racing
Houses, Model
Hunting
Imported Goods
Indian Novelties
Indoor Games
Ink Novelties
Insect Killers
Itching Powder
Jewelry
Joke Novelties
Ju Jitsu
Key Chains
Kits, Hobby
Keys, Master
Knives
Labels
Lamps
Lenses
Letters, Sweater
Lighters
Live Animals
Locks
Looms
Lovers' Items
Lucky Novelties
Luminous Items
Magic
Magnetic Items
Magazines
Magnifiers
Make Up Goods
Maps
Masks
Massagers
Medals
Microphones
Microscopes
Mineralogy
Mirrors
Model Supplies
Money Savers
Money Makers
Monkeys, Live
Motors
Movies
Muscle Builders
Musical Items
Numerology
Occult
Office Supplies
Openers
Optical Goods
Oriental Imports
Paints, Supplies
Party Novelties
Pennants
Pens, Pencils
Personal Magnetism
Pets, Supplies
Philatelic Sup.
Phones
Phonograph
Photography
Pins, Jewelry
Pipes
Pistols, Guns
Plants, Seeds
Plating Equip.
Poker Items
Printing Items
Projectors
Purses
Puzzles
Racers, Auto
Rackets
Radio Items
Razors, Etc.
Recipes
Religious Goods
Rifles, Guns
Rings, Jewelry
Rulers & Rules
Scientific App.
Seeds, Plants
Sewing Items
Sharpeners
Shaving Goods
Ship Models
Shockers
Signs, Supplies
Skeletons
Skirts, Hula
Skull Novelties
Skunk, Live
Slide Rules
Smokers' Items
Snake Novelties
Sneezing Items
Soap Novelties
Spiritualism
Sporting Goods
Stag Novelties
Stamp Col. Items
Stationery Sup.
Sure-Winners
Surprise Package
Sweater Emblems
Swim Items
Tattooing
Taxidermy
Team Supplies
Telegraph Sets
Telephones
Telescopes
Television Items
Thermometers
Throwing Knives
Tie Novelties
Time Savers
Tools
Toys
Trapping
Treasure Finders
Tricks
Trophies
Turtles
Typewriters
Vaults & Banks
Vendors
Ventriloquism
Wallets
Watches
Water Novelties
Weird Articles
Western Goods
Whips
Whistles
Wigs
Wrestling Items
& Many Others

SEND 10c TODAY WITH YOUR NAME AND COMPLETE ADDRESS—NO LETTER NECESSARY

Big 600 page catalog of over 7000 novelties, 3500 pictures, 6-color cover, 1-inch thick. Send 10c at once—no obligation. (Postage stamps accepted).
Rush 10c with name & address today to: JOHNSON SMITH & COMPANY, DEPT. 328, DETROIT 7, MICHIGAN

LIFETIME CHRONOGRAPH, STOP-WATCH
CALENDAR WATCH

It's also a TELEMETER & TACHOMETER

STOP
START
CALENDAR WINDER

NEW LOW PRICE 8.95 with Steel Expansion Band Plus 10% Tax (90c)

FULLY GUARANTEED for One Year

Plus Lifetime Service Certificate. 5-Day Free Trial.

31-Day Calendar
Changes dates automatically! For Sportsmen, Scouts, Photographers, Engineers, Chemists, Navigators, Doctors.

Remarkable Import Buy—these ideal all-around timepieces and chronographs at an unbelievable low, low price. Imported Swiss jeweled movement, Radium Glow 1" dial, red sweep-second hand, shock-resistant case, unbreakable crystal. And—included is the handsome, rich-looking steel expansion wristband. Complete instructions included together with guarantee and service certificate. White, Pink or Black dial face, specify color.

GAYLORD Dept. XA-7, Fifth & Hamilton, Pittsburgh 6, Pa.
enclose ☐ Check ☐ Money Order ☐ Send C.O.D.
Send______Chronograph watches at 8.95 (Postpaid), plus 10% tax on 5-day free trial. Money Back Guarantee. Name & Address on Margin.

BINOCULARS
TELESCOPES
Big Bargain Catalog Free
7x50 $36 Illustrated
BROWNSCOPE CO.
Dept. 1L
24 West 45th St.
New York 19, N. Y.

EVERYTHING For The AMATEUR
TELESCOPE MAKER
Make your own telescope. Quality supplies guaranteed. Complete 6" kit $5.50 up. Pyrex mirrors made to order. Aluminizing. Prisms—eyepieces—etc. Free catalog. Instructions—10c.
PRECISION OPTICAL SUPPLY CO.
1001 East 163rd St., New York 59, N. Y.

☆ GIANT ☆
ASTRONOMICAL TELESCOPE
Ready for use. 6 ft. tripod. 100 diameters magnification. (10,000 area magnification). Extra eyepiece especially suited to observing Milky Way, Nebulae, Comets, Double Stars and Star Clusters. Sun projector lens for watching sun spots. Full power and clear vision guaranteed. $15.00. 25% deposit on C.O.D. orders.
Shipped via Express F.O.B. Riverhead
SUFFOLK SCIENCE SERVICE
DEPT. AT RIVERHEAD, N. Y.

Telescope Maker's Page

[*Continued from page* 157]

succeeding scientific expeditions will find positive proof it was a meteorite.

The crater is 297 miles northwest of Fort Chimo, about 50 miles from Hudson Straits. The area is relatively unexplored, although geodetic survey parties have traversed it. The 10 billion tons of granite boulders the meteorite threw up, strewn for miles around, served to delay its discovery.

The crater is cone-shaped and rises to 550 feet above the tundra-covered plains that extend 30 miles or more in every direction. It is more than two miles from crest to crest. Inside the cone lies a lake two miles wide and covered with ice that is three feet thick even in the summer.

The largest known meteorite's crater up till now was El Diablo in Arizona, about a mile in diameter, the target of thousands of sightseers annually and the subject of scientific study by astronomers and mineralogists from all over the world. Ungava crater now dwarfs it.—*Ken W. MacTaggart.*

Paper Safe

[*Continued from page* 151]

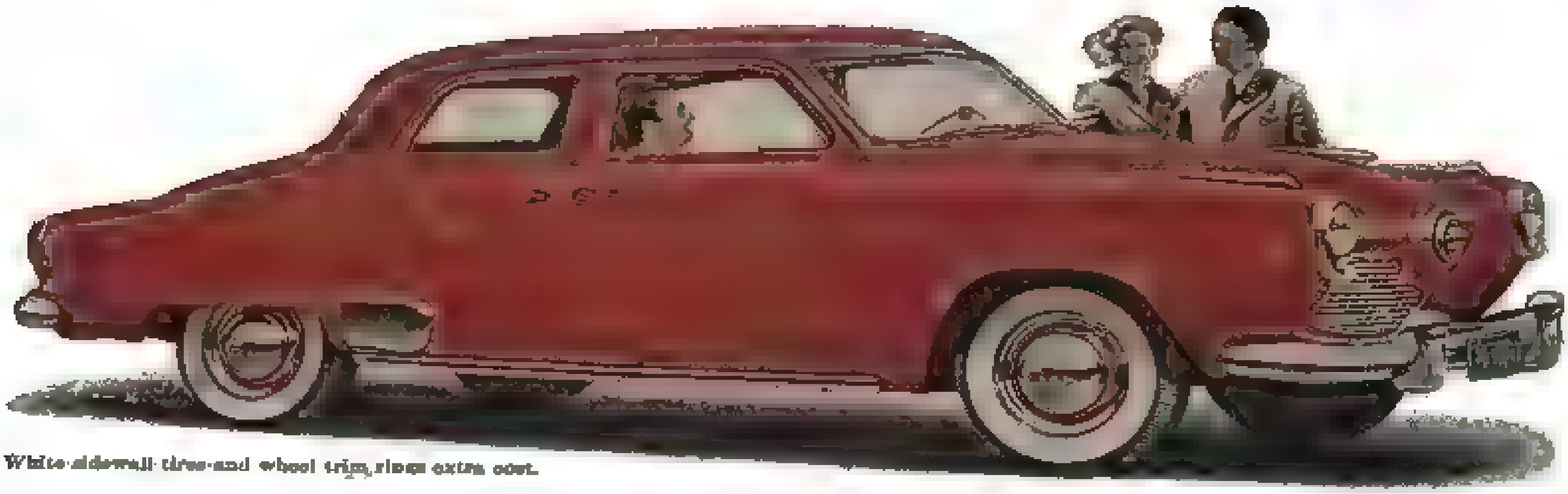
sions of the box are: 12 in. wide, 14 in. high, and 11 in. deep. This size will hold 100 sheets each of four grades of paper, in the 8x10 size.

Cut two 12x14 in. pieces for the back and door, two 12x11 in. pieces for the top and bottom and two 11x14 in. pieces for the sides. ¼ in. round strips will do for the shelf supports. Space these on the side pieces. As you assemble the box, make it completely light tight by sandwiching felt or weather-stripping between the parts.

Use a waterproof glue to cement strips of felt over the friction surfaces of the doorway. The strips of metal act as guides and light traps. Cut two 14 in. pieces and a 12 in. piece. Bend them through the middle, making sure you make a true right angle bend. •

6 EASY WOODWORKING PATTERNS . . . 25¢
Six woodworking patterns for attractive, easy-to-make projects. Actual size. Simple to follow, trace and cut out. Set includes: Wall Shelf (illustrated), Pipe Rack, Phone Holder, Plant Bracket, Novelty Table and Wall Plaque. All six patterns for only 25c, postpaid. Send to Stanley Tools, 611 Elm St., New Britain, Conn.
STANLEY
THE TOOL BOX OF THE WORLD

PRINTED IN U.S.A.



White sidewall tires and wheel trim rings extra cost.

A new driving thrill for you!
A new value!

Studebaker's great new V-8 Commander

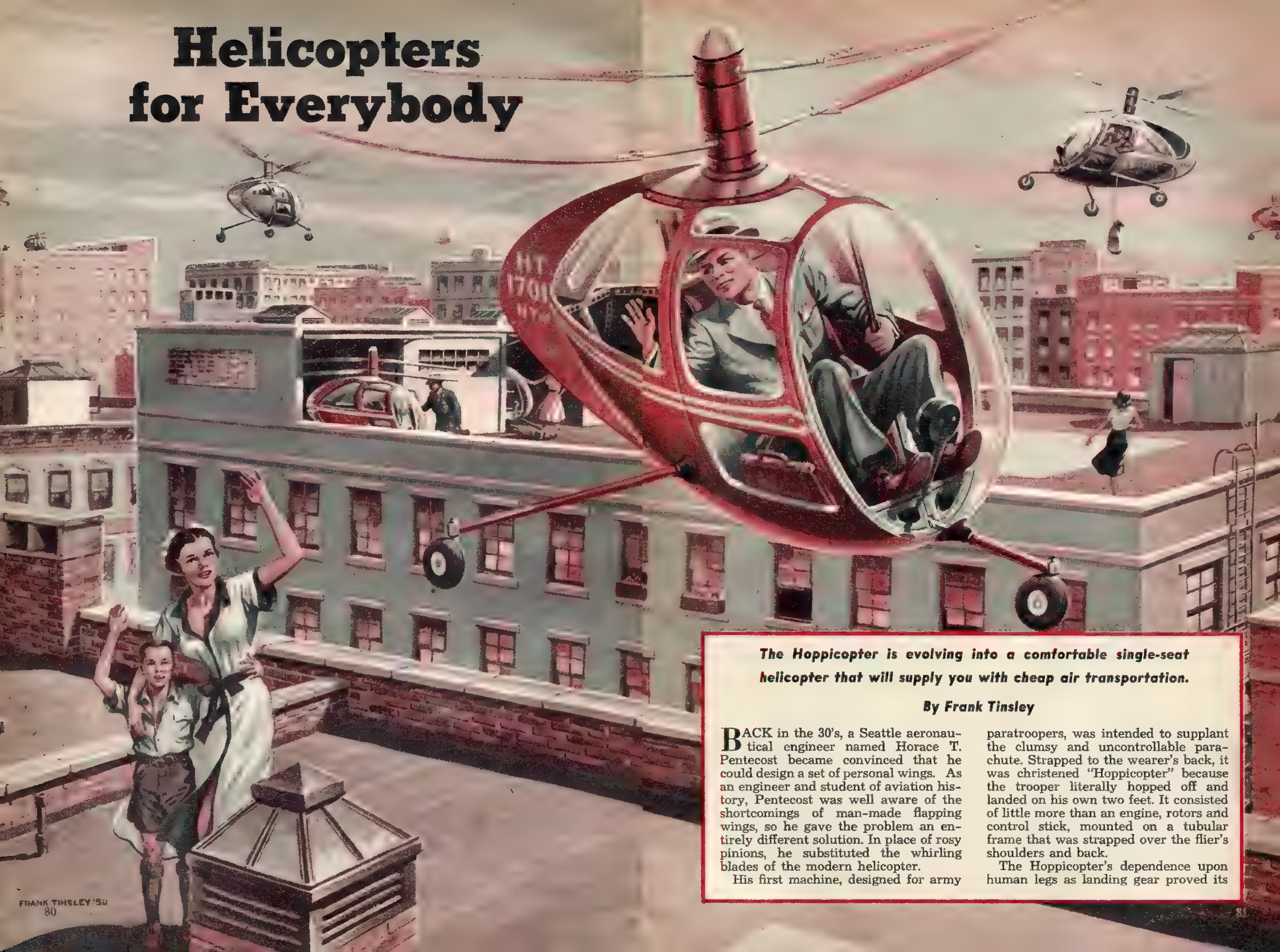
Styled with new Studebaker distinction!
Engineered for sparkling new performance!
Outstanding in low-cost operation!

Studebaker Automatic Drive is
"no clutch-no gearshift" motoring at its finest
Available at extra cost

Studebaker, South Bend 27, Indiana, U.S.A.

Double Page Spreads

Helicopters for Everybody



FRANK TINSLEY '50

The Hoppicopter is evolving into a comfortable single-seat helicopter that will supply you with cheap air transportation.

By Frank Tinsley

BACK in the 30's, a Seattle aeronautical engineer named Horace T. Pentecost became convinced that he could design a set of personal wings. As an engineer and student of aviation history, Pentecost was well aware of the shortcomings of man-made flapping wings, so he gave the problem an entirely different solution. In place of rosy pinions, he substituted the whirling blades of the modern helicopter.

His first machine, designed for army paratroopers, was intended to supplant the clumsy and uncontrollable parachute. Strapped to the wearer's back, it was christened "Hoppicopter" because the trooper literally hopped off and landed on his own two feet. It consisted of little more than an engine, rotors and control stick, mounted on a tubular frame that was strapped over the flier's shoulders and back.

The Hoppicopter's dependence upon human legs as landing gear proved its

Toys For Engineers

THREE years ago Homer H. Dasey was [illegible] he was [illegible] of the engineering office after [illegible]. His [illegible] was [illegible] mass produce some models [illegible] and [illegible] planners.

Today Dasey [illegible] of walking [illegible] offices [illegible] thousands of dollars worth of his equipment. For [illegible] used by some 500 firms [illegible] help them [illegible] more efficiently.

Dasey [illegible] the premise that there [illegible] between a stack of blueprints and the [illegible] layout [illegible] the production line. Often when a plant is set up [illegible] discovered errors which [illegible] three dimensions.

Now that's where Dasey comes in. Instead of blueprints, he builds a [illegible] factory [illegible] the last machine tool. When [illegible] finished, the engineers can move [illegible] conveyors and machines about [illegible] are thus able to foresee any possible [illegible].

The U. S. Navy uses Dasey models in [illegible] courses at stations [illegible]. Engineering universities also use the models for engineering courses and a leading dairy and food equipment manufacturer in Chicago has a model [illegible] as well as in planning. The [illegible] managers say they now make only one drawing [illegible] and [illegible] they used to make.

Yes, Dasey [illegible] American engineers [illegible] they are [illegible] ■

Homer H. Dasey, president of Visual Planning Equipment Company, checks scale specifications for some model equipment made in his own plant.

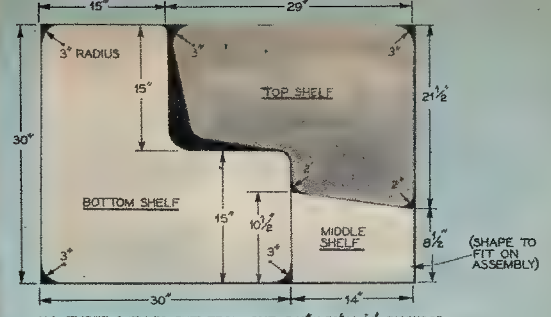
Small quantities are made completely by hand but for larger orders molds are prepared into which the liquefied materials are then carefully poured.

To show engineers how much space they must allow for a machine to "travel" Dasey fits small bits of plastic on the edges of the moving parts.

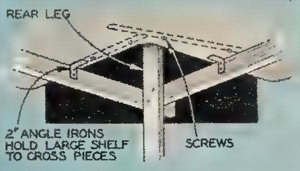
Snap fasteners were found to be perfect for simulating wheels and machine parts so Dasey uses them by the thousands. He [illegible] up work parts, too.

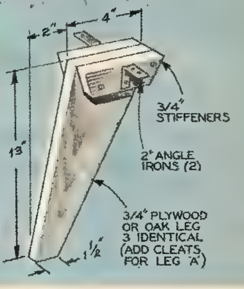
Tool-drawing specifications are checked against models of various machine tools. Note the tiny conveyors, rolling mills and multiple drill presses.

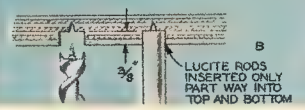
Here's one of Dasey's model factories complete in the tiniest detail. Now it's easier for the engineer to visualize every possible problem.

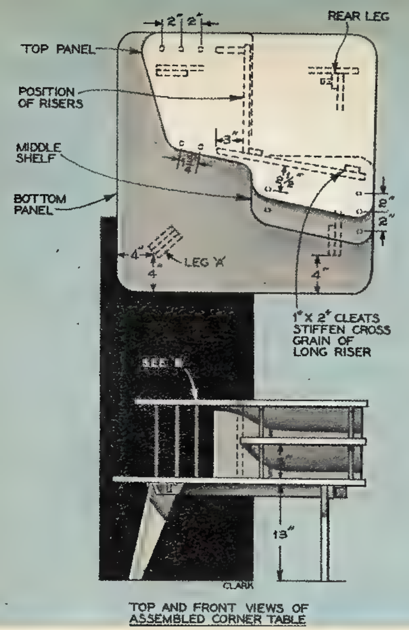

15"
29"
3" RADIUS
3"
15"
TOP SHELF
21½"
30"
BOTTOM SHELF
15"
10½"
3"
MIDDLE SHELF
8½"
(SHAPE TO FIT ON ASSEMBLY)
30"
14"

ALL THREE SHELVES CUT FROM ONE 3/4" X 30" X 44" PLYWOOD

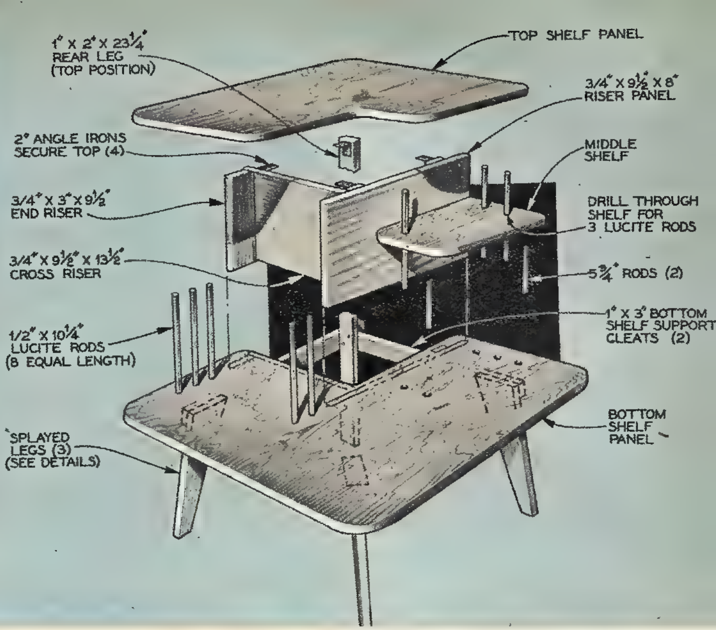

REAR LEG
2" ANGLE IRONS HOLD LARGE SHELF TO CROSS PIECES
SCREWS


2"
4"
3/4" STIFFENERS
13"
2" ANGLE IRONS (2)
3/4" PLYWOOD OR OAK LEG 3 IDENTICAL (ADD CLEATS FOR LEG 'A')
1½"


B
3/8
LUCITE RODS INSERTED ONLY PART WAY INTO TOP AND BOTTOM


2"
2"
REAR LEG
TOP PANEL
POSITION OF RISERS
MIDDLE SHELF
BOTTOM PANEL
3"
1¾
2½"
2"
2"
4"
4
LEG 'A'
4"
1" X 2" CLEATS STIFFEN CROSS GRAIN OF LONG RISER
SEE B
13"
CLARK

TOP AND FRONT VIEWS OF ASSEMBLED CORNER TABLE


1" X 2" X 23¼" REAR LEG (TOP POSITION)
TOP SHELF PANEL
3/4" X 9½" X 8" RISER PANEL
2" ANGLE IRONS SECURE TOP (4)
MIDDLE SHELF
3/4" X 3" X 9½" END RISER
DRILL THROUGH SHELF FOR 3 LUCITE RODS
3/4" X 9½" X 13½" CROSS RISER
5¾" RODS (2)
1" X 3" BOTTOM SHELF SUPPORT CLEATS (2)
1/2" X 10¼" LUCITE RODS (8 EQUAL LENGTH)
SPLAYED LEGS (3) (SEE DETAILS)
BOTTOM SHELF PANEL

triple-tiered table

Tired of clumsy conventional corner units? Then build this roomy table that offers ample and instantly accessible space.

By Robert Hoppough

DESPITE the tricky appearance of this cleverly designed unit, there's not a complicated joint required in the entire assembly. In fact, you can't even see where most of the elements join unless you turn the table upside down. And if you've discovered how impractical those commercial corner units are with their triangular dust-catching shelves, this job will really appeal to you. It provides ample space for magazines, a niche to hold a few books or a small radio and a surface for a lamp. Also, the entire affair is plenty high enough to clean under. The space behind the risers has been deliberately left open. If you can use an extra hidden compartment, modify the bottom shelf accordingly.

Here are the main steps: Cut out the legs and 1x3-in. cross pieces and join them so that the glue will have a chance to dry while you cut and sand the shelves.

You'll note from the cutting diagram for the shelves that material can be saved by making the cuts as shown. Another saving can be made by substituting ½-in. dowels for the Lucite rods. The Lucite will add considerably to the appearance of the table, though, and will probably cost only a few dollars extra.

Next cut out the riser boards, round the ends as shown, sand all outside surfaces, and attach to the bottom shelf. Some glue in addition to screws will help to make the table rigid. Be careful not to dab any glue on the exterior surfaces where it will interfere with a good finishing job later.

Now drill the holes ⅜-in. deep in the bottom shelf for the rods. Lay the small middle shelf right over these holes to mark where to drill next. (If you have a drill press the job is of course simplified, but be sure to make these holes before attaching the legs to the bottom shelf.) Note that the two short outer rods do not penetrate clear through this shelf, but just far enough to keep them secure.

The glue on the leg assemblies should be set by now. Therefore attach the legs and temporarily screw on the top shelf after first inserting all the rods.

Be sure that you adjust all the rods into their proper parallel position. Mark off the circles where they touch the top shelf. Remove the latter and bore the holes.

Next remove the rods and complete the surfacing of the wood. Remember that No. 0 or 00 steel wool gives a smooth satiny finish as a finale to a good sandpapering. From there it's a matter of choice. The paint-on, wipe-off system gives a good modern touch when followed by a few coats of shellac rubbed down between coats with steel wool.

You're ready for the ultimate thrill of accomplishment now. Insert the rods, attach the top shelf and work each rod into its proper place. Then set your table in that gaping corner—and put it to work! •

1 Rear view shows 2-in. brackets that reinforce glue and screws. Empty space can be adapted to your own needs for storage or even a radio chassis.

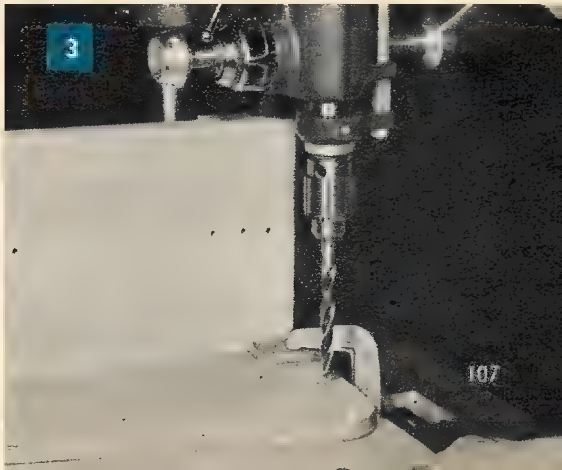
2 Squaring legs and reinforcement pieces with a disk sander. Note scrap piece on table which keeps the leg perpendicular to the disk surface.

3 Holes for Lucite rods in middle shelf and lower table surface are made simultaneously. Do not penetrate the lower piece more than about ⅜ in.

1

2

3



The Great Joiner

By Clarence A. Martin
Chairman, Industrial Arts, Erasmus Hall
High School, Brooklyn, N. Y.

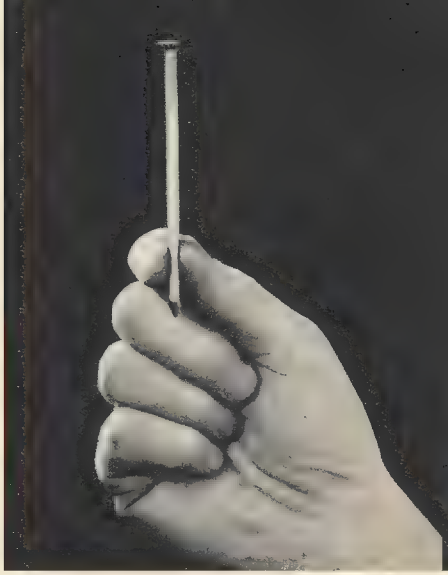


Photo by G Tewksbury

THE popular saying that one is as sharp as a tack but just as flat-headed could also apply to the needle-pointed nail. This little sharpie is only one of more than 1100 types and sizes of nails that are being manufactured today.

The nail, one of the greatest of joiners, is now so commonplace that its importance to the world of today is generally overlooked. The shortages during World War II spotlighted its importance. The lack of nails was felt especially in the building trades as about 400 pounds of them are used in the construction of the average home.

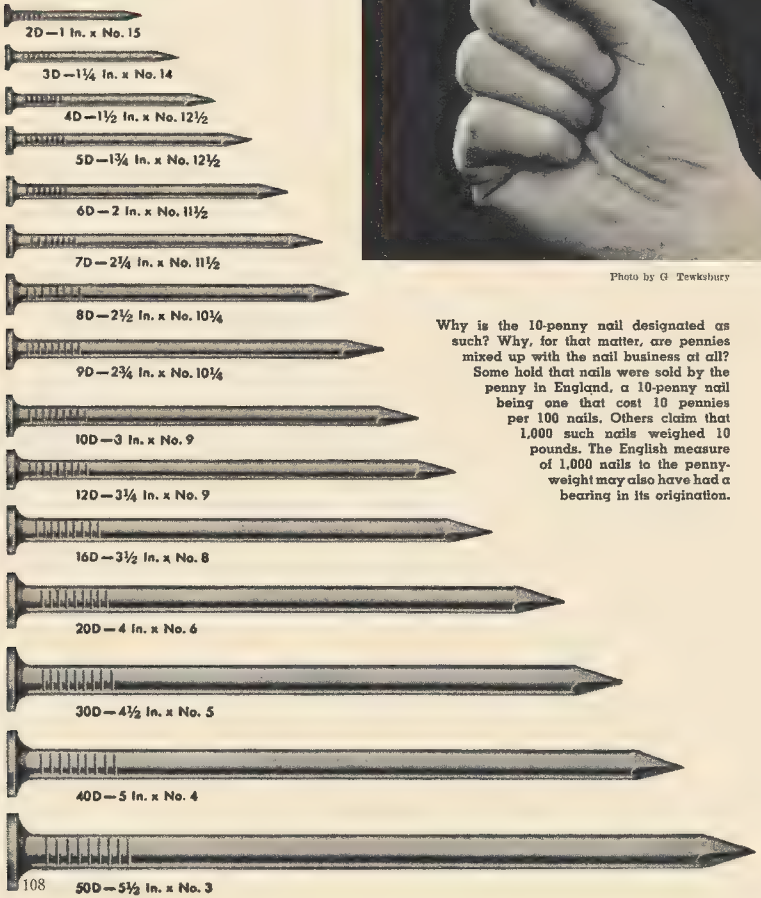
In 1948 the steel mills made about a million tons of nails that ranged from [illegible] of an inch to 15 inches in length. Most of them however were between three-penny (1¼ inches) and twenty-penny (4 inches). The majority of these are made of steel wire, in fact, about 20 per cent of all of the steel wire that is produced is used in the manufacture of nails.

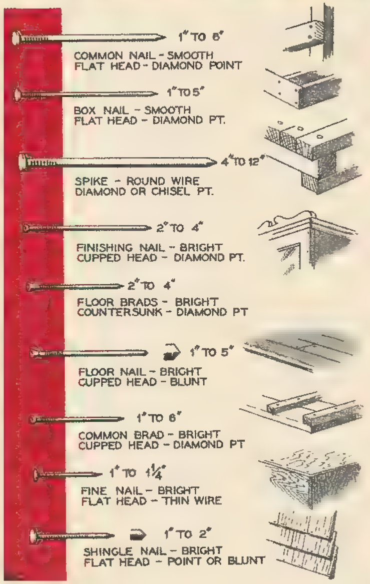
A primitive form of fastening that was used by prehistoric man was a leather thong made from the hide of animals. This method is still in use today where civilization has not penetrated. Fastening with thongs was followed by the use of wood pins. These same kind of wood pins were still being used for holding together large timbers until quite recently when large size spikes were made generally available.

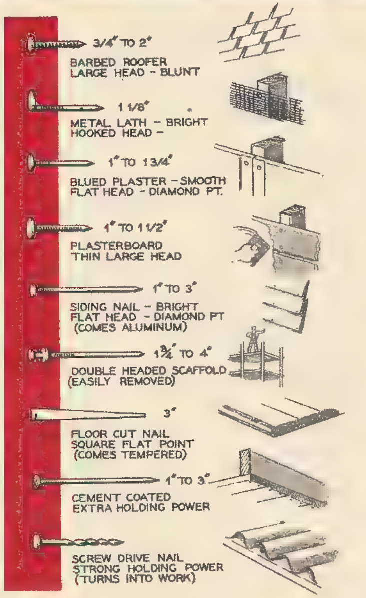
Probably the first reference to nails was made about 1055 B. C. in Chronicles XXII, 3 "And David prepared iron in abundance for the nails, for the doors of the gates, and for the couplings."

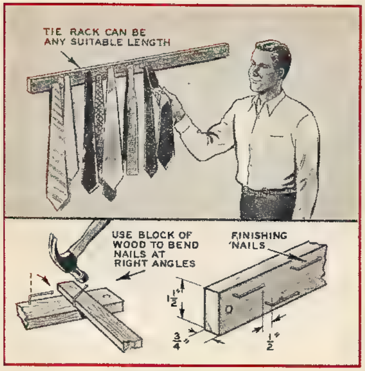
For centuries nails were formed by hand on an anvil. This was a home industry in which all members of the family participated. During the seventeenth century the methods used in producing the nail rods were improved to such an extent that the industry grew tremendously. The heads of the nails however were still forged by a hand operation. In Birmingham, England, the center of the world nail industry at the beginning of that century, more [*Continued on page 170*]

Why is the 10-penny nail designated as such? Why, for that matter, are pennies mixed up with the nail business at all? Some hold that nails were sold by the penny in England, a 10-penny nail being one that cost 10 pennies per 100 nails. Others claim that 1,000 such nails weighed 10 pounds. The English measure of 1,000 nails to the pennyweight may also have had a bearing in its origination.


2D—1 In. x No. 15
3D—1¼ In. x No. 14
4D—1½ In. x No. 12½
5D—1¾ In. x No. 12½
6D—2 In. x No. 11½
7D—2¼ In. x No. 11½
8D—2½ In. x No. 10¼
9D—2¾ In. x No. 10¼
10D—3 In. x No. 9
12D—3¼ In. x No. 9
16D—3½ In. x No. 8
20D—4 In. x No. 6
30D—4½ In. x No. 5
40D—5 In. x No. 4
50D—5½ In. x No. 3


1" TO 6"
COMMON NAIL - SMOOTH
FLAT HEAD - DIAMOND POINT
1" TO 5"
BOX NAIL - SMOOTH
FLAT HEAD - DIAMOND PT.
4" TO 12"
SPIKE - ROUND WIRE
DIAMOND OR CHISEL PT.
2" TO 4"
FINISHING NAIL - BRIGHT
CUPPED HEAD - DIAMOND PT.
2" TO 4"
FLOOR BRADS - BRIGHT
COUNTERSUNK - DIAMOND PT
1" TO 5"
FLOOR NAIL - BRIGHT
CUPPED HEAD - BLUNT
1" TO 6"
COMMON BRAD - BRIGHT
CUPPED HEAD - DIAMOND PT
1" TO 1¼"
FINE NAIL - BRIGHT
FLAT HEAD - THIN WIRE
1" TO 2"
SHINGLE NAIL - BRIGHT
FLAT HEAD - POINT OR BLUNT

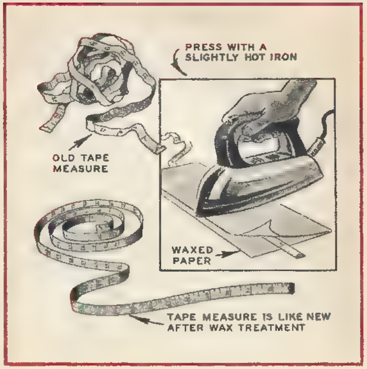

3/4" TO 2"
BARBED ROOFER
LARGE HEAD - BLUNT
1 1/8"
METAL LATH - BRIGHT
HOOKED HEAD -
1" TO 1 3/4"
BLUED PLASTER - SMOOTH
FLAT HEAD - DIAMOND PT.
1" TO 1 1/2"
PLASTERBOARD
THIN LARGE HEAD
1" TO 3"
SIDING NAIL - BRIGHT
FLAT HEAD - DIAMOND PT
(COMES ALUMINUM)
1¾" TO 4"
DOUBLE HEADED SCAFFOLD
(EASILY REMOVED)
3"
FLOOR CUT NAIL
SQUARE FLAT POINT
(COMES TEMPERED)
1" TO 3"
CEMENT COATED
EXTRA HOLDING POWER
SCREW DRIVE NAIL
STRONG HOLDING POWER
(TURNS INTO WORK)


TIE RACK CAN BE ANY SUITABLE LENGTH
USE BLOCK OF WOOD TO BEND NAILS AT RIGHT ANGLES
FINISHING NAILS
1½"
¾"
½"

Simple tie rack. This has no moving parts to wear out and does not use any hard to get materials. A piece of wood with finishing nails driven in and bent to one side and painted, does the trick.

A check to find out how much liquid remains in that butane tank. When the tank is relatively cool pour about a gallon of water, just as warm as your hand will comfortably bear, down the outside of the tank.

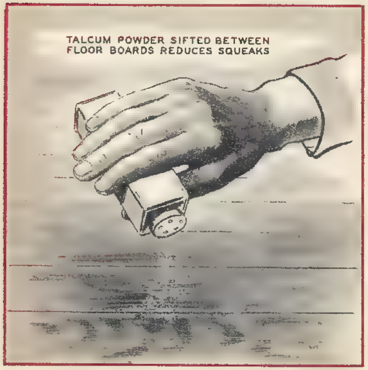
After pouring the water on the tank, wait about ten or fifteen seconds, then run your hand slowly down the side of the tank. Quite a sharp change in the temperature will easily be felt at the liquid level.


PRESS WITH A SLIGHTLY HOT IRON
OLD TAPE MEASURE
WAXED PAPER
TAPE MEASURE IS LIKE NEW AFTER WAX TREATMENT

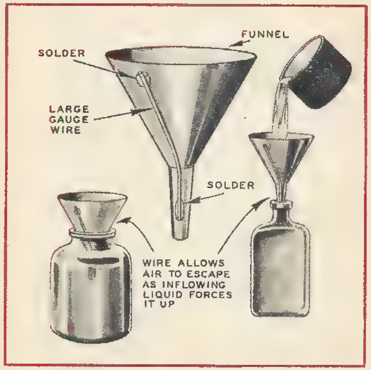
New life for the limp tape measure. You can give it a new lease on life again if you place it between two sheets of waxed paper and press it with a slightly hot iron. It will be stiff and easy to use once more.

around the house

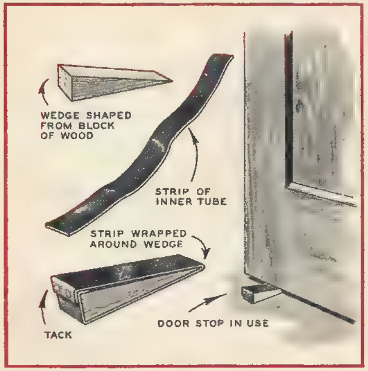
Stop squeak. Is that creaking floor getting on your nerves? It's sometimes caused by the rubbing of one floor board against another. They can often be stopped from squeaking by sifting talcum powder.


TALCUM POWDER SIFTED BETWEEN FLOOR BOARDS REDUCES SQUEAKS

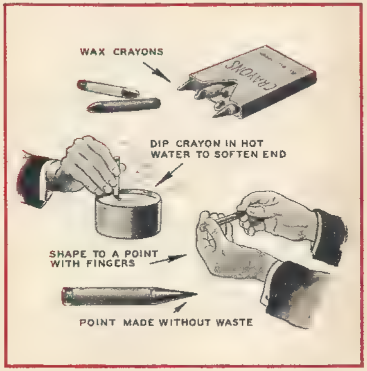
Wire on funnel allows the air to escape from the neck of a bottle. A piece of large gauge wire, such as solid galvanized clothes line, soldered to the side of a funnel will solve your pouring problems very quickly.

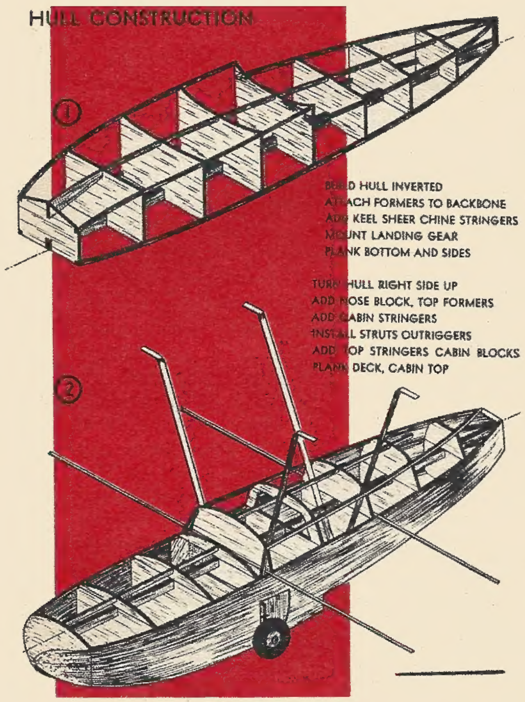

FUNNEL
SOLDER
LARGE GAUGE WIRE
SOLDER
WIRE ALLOWS AIR TO ESCAPE AS INFLOWING LIQUID FORCES IT UP

To make a good door stop use a wedge shaped board and a strip of inner tube. Stretch the rubber strip tightly around the thin end of the wedge and tack the ends firmly to the thick end, as shown below.


WEDGE SHAPED FROM BLOCK OF WOOD
STRIP OF INNER TUBE
STRIP WRAPPED AROUND WEDGE
TACK
DOOR STOP IN USE

Economical way to sharpen wax crayons, is to get a can of hot water and dip the crayon's tip in it for a minute or two. You can then easily shape them into a good point. They will last longer and work better.


WAX CRAYONS
CRAYONS
DIP CRAYON IN HOT WATER TO SOFTEN END
SHAPE TO A POINT WITH FINGERS
POINT MADE WITHOUT WASTE


HULL CONSTRUCTION
①
BUILD HULL INVERTED
ATTACH FORMERS TO BACKBONE
ADD KEEL SHEER CHINE STRINGERS
MOUNT LANDING GEAR
PLANK BOTTOM AND SIDES
②
TURN HULL RIGHT SIDE UP
ADD NOSE BLOCK, TOP FORMERS
ADD CABIN STRINGERS
INSTALL STRUTS OUTRIGGERS
ADD TOP STRINGERS CABIN BLOCKS
PLANK DECK, CABIN TOP

Carve the engine nacelle and hollow it out as shown. Make the firewall from $\frac{1}{16}$ in. plywood and drill to fit your motor. Attach your engine to the firewall. Give both surfaces several thin coats of cement before cementing the firewall to the nacelle permanently. Cover the nacelle with strips of Jap tissue and clear dope. Brush on three thin coats of silver dope and sand between each coat. Use the same cementing procedure in attaching the nacelle to the wing bottom as used for the firewall.

Cover the wing frame with yellow Jap tissue and shrink with water before brushing on four thin coats of clear dope. Make balsa engine cowl and cover with tissue and clear dope. Give it three coats of thin silver dope and attach to the tank as shown.

Build the floats inverted and cover them with tissue and clear dope and then apply three thin coats of silver dope. Attach the outrigger struts and add the remaining struts and paint them silver. Cement the tail wheel to the rear end of the hull.

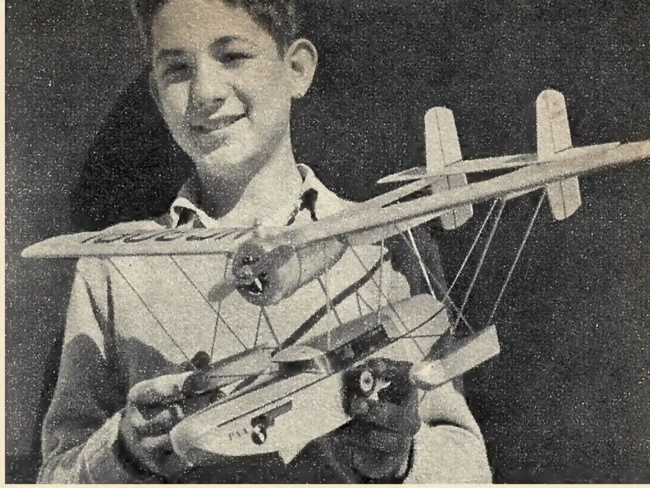
Decorations such as the Pan-American insignia, window frames, ailerons, rudder and stablizer, outlines and license can be cut from black tissue or Trim-Film decal. A coat of hot-fuel proofer over the entire model will preserve the plane much longer and it is recommended. The original model balanced at $\frac{1}{3}$ of wing chord. Glide by hand over grass before you make a power flight to check its balance and stability. A little right rudder may be used to circle the model. Hand launch your model for test flights before trying flights from ground or flights from water. The ship will climb fairly fast and glide nicely so be ready to chase your flying boat.

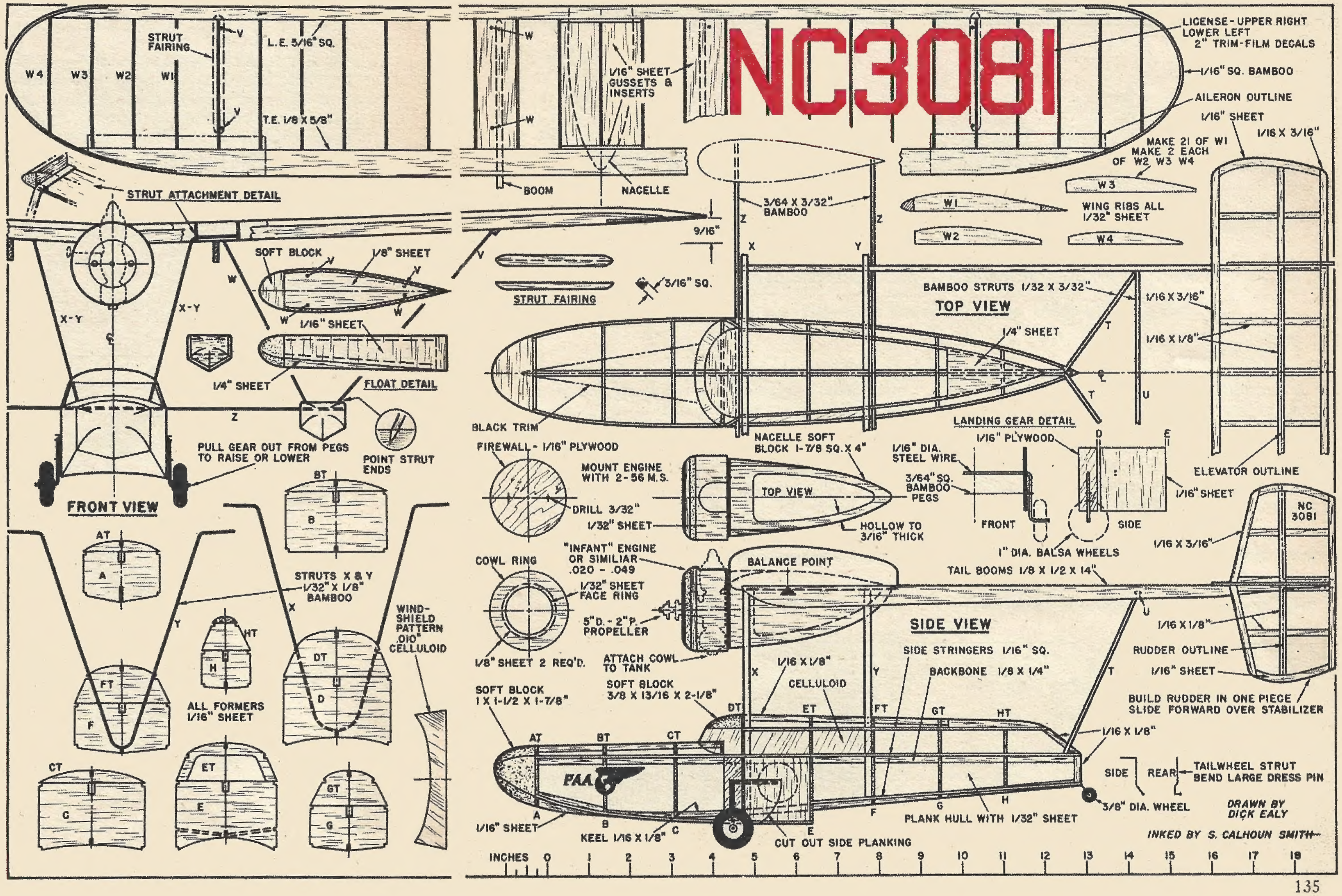
One of the important things to remember when flying your scale model plane is the same thing that pilots of all amphibians worry about, the landing gear. You can get into as much trouble on a smaller scale if you have the gear in the wrong position for a landing. More than one pilot has had quite a surprise as he tore the belly out of his plane by not having the gear down. •

FULL-SIZE PLANS

of this model can be obtained by sending 50c to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 421.

Hand launch your model on its test flights before you try ground or water flights to check stability and avoid accidents.




STRUT FAIRING
L.E. 5/16" SQ.
W4
W3
W2
W1
V
T.E. 1/8 X 5/8"
W
1/16" SHEET GUSSETS & INSERTS
BOOM
NACELLE
NC3081
LICENSE - UPPER RIGHT LOWER LEFT 2" TRIM-FILM DECALS
1/16" SQ. BAMBOO
AILERON OUTLINE
1/16" SHEET
1/16 X 3/16"
MAKE 21 OF W1 MAKE 2 EACH OF W2 W3 W4
W3
W1
W2
W4
WING RIBS ALL 1/32" SHEET
STRUT ATTACHMENT DETAIL
3/64 X 3/32" BAMBOO
Z
9/16"
X
Y
SOFT BLOCK
1/8" SHEET
1/16" SHEET
1/4" SHEET
FLOAT DETAIL
3/16" SQ.
STRUT FAIRING
X-Y
Z
PULL GEAR OUT FROM PEGS TO RAISE OR LOWER
POINT STRUT ENDS
FRONT VIEW
BAMBOO STRUTS 1/32 X 3/32"
TOP VIEW
1/4" SHEET
1/16 X 3/16"
1/16 X 1/8"
T
U
BLACK TRIM
LANDING GEAR DETAIL
FIREWALL - 1/16" PLYWOOD
NACELLE SOFT BLOCK 1-7/8 SQ. X 4"
MOUNT ENGINE WITH 2-56 M.S.
TOP VIEW
DRILL 3/32"
1/32" SHEET
HOLLOW TO 3/16" THICK
1/16" DIA. STEEL WIRE
3/64" SQ. BAMBOO PEGS
1/16" PLYWOOD
D
E
FRONT
SIDE
1" DIA. BALSA WHEELS
ELEVATOR OUTLINE
1/16" SHEET
NC 3081
1/16 X 3/16"
AT
A
BT
B
STRUTS X & Y 1/32" X 1/8" BAMBOO
HT
H
DT
D
FT
F
ALL FORMERS 1/16" SHEET
WIND-SHIELD PATTERN .010" CELLULOID
CT
C
ET
E
GT
G
COWL RING
"INFANT" ENGINE OR SIMILIAR .020 - .049
1/32" SHEET FACE RING
5" D. - 2" P. PROPELLER
1/8" SHEET 2 REQ'D.
ATTACH COWL TO TANK
BALANCE POINT
TAIL BOOMS 1/8 X 1/2 X 14"
SIDE VIEW
1/16 X 1/8"
SIDE STRINGERS 1/16" SQ.
BACKBONE 1/8 X 1/4"
CELLULOID
RUDDER OUTLINE
1/16" SHEET
BUILD RUDDER IN ONE PIECE SLIDE FORWARD OVER STABILIZER
SOFT BLOCK 1 X 1-1/2 X 1-7/8"
SOFT BLOCK 3/8 X 13/16 X 2-1/8"
PAA
1/16" SHEET
KEEL 1/16 X 1/8"
CUT OUT SIDE PLANKING
PLANK HULL WITH 1/32" SHEET
1/16 X 1/8"
SIDE
REAR
TAILWHEEL STRUT BEND LARGE DRESS PIN
3/8" DIA. WHEEL
DRAWN BY DICK EALY
INKED BY S. CALHOUN SMITH
INCHES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

fundamentals of alternating current

You can unmask the mysteries of basic electrical theory by performing these simple experiments.

By Tracy Diers

SCIENTISTS of a century ago knew there were two types of electric current—direct and alternating. It was quite natural that DC received more attention those days only because it could be easily produced by chemical means. As more scientists focused their attention on the radically new alternating current it became more apparent that AC simply would not play the game under the same rules that DC employed. The following experiments point out the contrasting behavior patterns of these two different types of a single force.

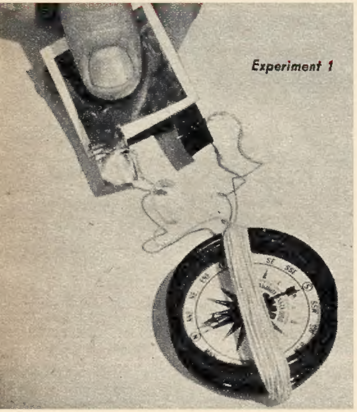
Experiment 1. Direct current is easier to produce. Once started, it will flow continuously in one direction. Obtain a sensitive compass and wind 70 or 80 turns of No. 28 double cotton-covered wire around it. You have made a galvanometer, which is an instrument for measuring electric current. Dip a piece of blotting paper in vinegar and squeeze it between a piece of copper and a piece of zinc. Connect the galvanometer wires to this simple cell, one wire to the copper and the other to the zinc.

Compass needle immediately swings over and will stay in that position as long as there is life in the cell. If you reverse the wires, a direct current will flow again, but in the opposite direction—as proved by the compass needle's swing the other way (fig. 1).

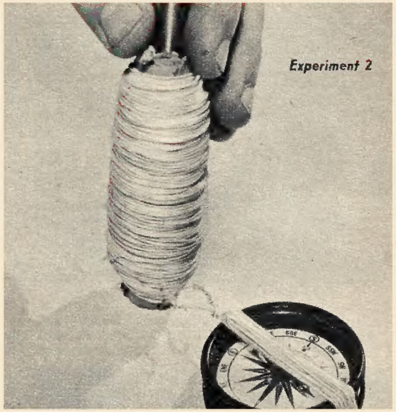
Experiment 2. Let us see how AC differs. You will need a solenoid, which is nothing more than a coil for the production of a magnetic field. This is how it is made: wind about 300 ft. of No. 30 double cotton-covered wire on a form about 3½ in. long and ⅝ in. in diameter. Connect the two wires to the galvanometer wires, and obtain a strong bar magnet. Stand the solenoid upright and quickly plunge the magnet into the solenoid. The compass needle will immediately swing to one side and then return to its former position. If you suddenly withdraw the magnet the needle kicks again, but this time in the opposite direction. Thrust the magnet in and out of the solenoid with a smooth motion and you will be generating a low frequency alternating current.

If your movements have been smooth you will have produced the famous *sine wave* which engineers are always talking about. Fig. 2 shows that the current flowing to the galvanometer is rising and falling, but is also reversing itself. The sine wave shows one cycle and means you have plunged the magnet and taken it out one time. The number of times you do this per second is called *frequency*. If you have AC at home examine your meter box for the frequency marking. It will probably be 60 cycles per second.

When a current rises and falls and still



Above: Galvanometer is formed by coiling wire around a compass and leading wire ends to plates of zinc and copper with vinegar-soaked blotter between them. Below: Resultant current graph.



Above: You can produce alternating current by regularly inserting and withdrawing bar magnet in this elementary solenoid. Below: The sine curve shows how one cycle is actually determined.

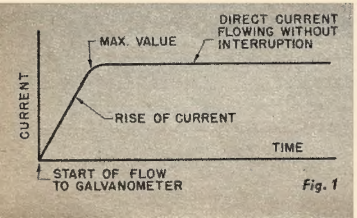


Fig. 1

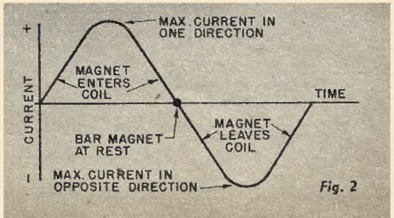
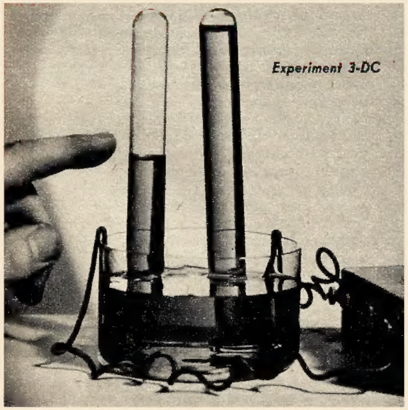
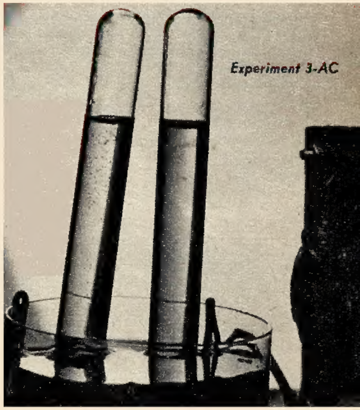


Fig. 2

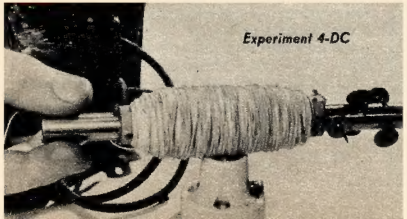


Under this experiment, DC will break water down to its two component parts, hydrogen and oxygen.

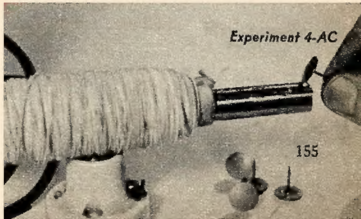


With AC, however, you get an equal mixture of both gases in tubes. See text for explanation.

Steel bar placed in solenoid becomes magnetized when direct current is introduced through it.



The magnetism is destroyed after AC has been allowed to run through the bar for a few minutes.



SHOP SMITH
FOR ACCURACY

$189.50

FOR COMPLETE 5-TOOL UNIT WITHOUT MOTOR

Price effective January 1, 1951

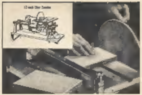
TAKE another look at the photo above. See those paper-thin strips? All four were sliced from the same piece of wood in sixty seconds *without changing the rip fence setting*. How? It's easy with SHOPSMITH. You can shift the *saw blade* as well as the fence—using SHOPSMITH's exclusive micro-feed blade adjustment.

There's not much you can do with wood strips. What's important is the speed and extreme accuracy of SHOPSMITH's fence-to-blade settings. And this is just one of SHOPSMITH's many precision features.

The disc sander, for example, feeds into the work, can be set to stop on a hairline. The vertical and horizontal drill presses have built-in jigs, unique micro-settings. The centerless ground steel ways are stress-tested at over a ton, assure absolute rigidity and accuracy in lathe work as well as in other operations.

Add 'em all up—accuracy, capacity, flexibility, rugged construction and precision features—and you'll begin to see why SHOPSMITH is America's most popular power tool. See SHOPSMITH demonstrated at leading hardware and department stores or any Montgomery Ward store. And for complete details and specifications, mail the coupon.

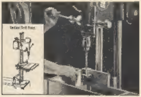
BLADE TO FENCE—48". You won't find many saws under $200 that offer capacity like this. It means you can cut to the center of 8' plywood panels, handle extra-long boards, trim doors, screens, storm sash. Table tilts, raises, lowers. Maximum depth of cut 2¼".



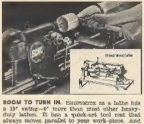
90° ON THE NOSE. SHOPSMITH as a disc sander is so accurate you can forget about your try square. Can be used as a jointer too. Work fed through at a slight angle (by cocking fence) comes out with a beautifully jointed edge. Sandpaper discs easily replaced.

Horizontal Drill Press

PERFECT DOWELED JOINTS. No jigs required. Just lay the work flat on the table, feed drill from side. Dowel holes match perfectly. Horizontal drill is especially useful when drilling large, awkward work. Its capacity is limited only by the length of your workshop.



FLOOR MODEL, TABLE MODEL. SHOPSMITH as a drill press is both. Maximum clearance, table to chuck, 27", floor to chuck, 56". Jacobs key chuck takes drills up to ½" diameter. Speeds range from 875 to 3500 rpm. 4" quill feed. Easy to read, adjustable depth scale.



ROOM TO TURN IN. SHOPSMITH as a lathe has a 15" swing—4" more than most other heavy-duty lathes. It has a quick-set tool rest that always moves parallel to your work-piece. And it's the only lathe that lets you face the work while face-plate turning.

NEW RETRACTABLE CASTERS

. . . increase SHOPSMITH'S already great flexibility. They're easily mounted on any wood or metal bench. Easy to set, too, with three-stage foot levers that raise or lower unit. Your SHOPSMITH dealer has them. Complete set . . . . $11.95.

ADDRESS:

SHOPSMITH, *Dept. 153-M, at factory nearest you:*

12819 Coit Road, Cleveland 8, Ohio, OR
417 Montgomery Street, San Francisco 4, Calif.

Please send me the free SHOPSMITH booklet.

Name ________________________

Address ________________________

City ________________ *State* ________

EX LIBRIS
Anonymous
Malefactor
MVSIQVE AND SWEET POETRIE AGREE
AS THEY MVST NEEDES
DATE
H OSPOVAT